<110> Morrell, Matthew

Li, Zhongyi

Rahman, Sadequr

Appels, Rudolph

<120> GENES ENCODING WHEAT STARCH SYNTHASES AND USES THEREFOR

<130> 72715Supplemental

<140> 10/018,418

<141> 2002-05-09

<160> 59

<170> PatentIn version 3.1

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gcggaccaac ccgcgcatcg tatcacgatc acccacccog atcccggccg ccgcc atg   178
                                                               Met

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tcg tcg gcg gtc gcg tcc gcc gcg tcc ttc ctc gcg ctc gcg tcc gcc      226
Ser Ser Ala Val Ala Ser Ala Ala Ser Phe Leu Ala Leu Ala Ser Ala
            5           10                  15

tcc ccc ggg aga tca cgg agg agg acg agg gtg agc gcg tcg cca ccc      274
Ser Pro Gly Arg Ser Arg Arg Arg Thr Arg Val Ser Ala Ser Pro Pro
        20                  25                  30

cac acc ggg gct ggc agg ttg cac tgg ccg ccg tcg ccg ccg cag cgc      322
His Thr Gly Ala Gly Arg Leu His Trp Pro Pro Ser Pro Pro Gln Arg
        35                  40                  45

acg gct cgc gac gga gcg gtg gcc gcg cgc gcc gcc ggg aag aag gac      370
Thr Ala Arg Asp Gly Ala Val Ala Ala Arg Ala Ala Gly Lys Lys Asp
50                  55                  60                  65

gcg ggg atc gac gac gcc gcg ccc gcg agg cag ccc cgc gca ctc cgc      418
Ala Gly Ile Asp Asp Ala Ala Pro Ala Arg Gln Pro Arg Ala Leu Arg
                70                  75                  80

ggt ggc gcc gcc acc aag gtt gcg gag cgg agg gat ccc gtc aag acg      466
Gly Gly Ala Ala Thr Lys Val Ala Glu Arg Arg Asp Pro Val Lys Thr
            85                  90                  95

ctc gat cgc gac gcc gcg gaa ggt ggc gcg ccg tcc ccg ccg gca ccg      514
Leu Asp Arg Asp Ala Ala Glu Gly Gly Ala Pro Ser Pro Pro Ala Pro
        100                 105                 110

agg cag gag gac gcc cgt ctg ccg agc atg aac ggc atg ccg gtg aac      562
Arg Gln Glu Asp Ala Arg Leu Pro Ser Met Asn Gly Met Pro Val Asn
        115                 120                 125

ggt gaa aac aaa tct acc ggc ggc ggc ggc gcg act aaa gac agc ggg      610
Gly Glu Asn Lys Ser Thr Gly Gly Gly Gly Ala Thr Lys Asp Ser Gly
130                 135                 140                 145

ctg ccc gca ccc gca cgc gcg ccc cag ccg tcg agc cag aac aga gta      658
Leu Pro Ala Pro Ala Arg Ala Pro Gln Pro Ser Ser Gln Asn Arg Val
                150                 155                 160

ccg gtg aat ggt gaa aac aaa gct aac gtc gcc tcg ccg ccg acg agc      706
Pro Val Asn Gly Glu Asn Lys Ala Asn Val Ala Ser Pro Pro Thr Ser
            165                 170                 175

ata gcc gag gtc gcg gct ccg gat ccc gca gct acc att tcc atc agt      754
Ile Ala Glu Val Ala Ala Pro Asp Pro Ala Ala Thr Ile Ser Ile Ser
        180                 185                 190

gac aag gcg cca gag tcc gtt gtc cca gcc gag aag gcg ccg ccg tcg      802
Asp Lys Ala Pro Glu Ser Val Val Pro Ala Glu Lys Ala Pro Pro Ser
        195                 200                 205

tcc ggc tca aat ttc gtg ccc tcg gct tct gct ccc ggg tct gac act      850
Ser Gly Ser Asn Phe Val Pro Ser Ala Ser Ala Pro Gly Ser Asp Thr
210                 215                 220                 225

gtc agc gac gtg gaa ctt gaa ctg aag aag ggt gcg gtc att gtc aaa      898
Val Ser Asp Val Glu Leu Glu Leu Lys Lys Gly Ala Val Ile Val Lys
                230                 235                 240

gaa gct cca aac cca aag gct ctt tcg ccg ccc gca gca ccc gct gta      946
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Glu Ala Pro Asn Pro Lys Ala Leu Ser Pro Pro Ala Ala Pro Ala Val
            245             250             255

caa caa gac ctt tgg gac ttc aag aaa tac att ggt ttc gag gag ccc    994
Gln Gln Asp Leu Trp Asp Phe Lys Lys Tyr Ile Gly Phe Glu Glu Pro
        260             265             270

gtg gag gcc aag gat gat ggc cgg gct gtt gca gat gat gcg ggc tcc   1042
Val Glu Ala Lys Asp Asp Gly Arg Ala Val Ala Asp Asp Ala Gly Ser
    275             280             285

ttc gaa cac cac cag aat cac gat tcc ggg cct ttg gca ggg gag aac   1090
Phe Glu His His Gln Asn His Asp Ser Gly Pro Leu Ala Gly Glu Asn
290             295             300             305

gtc atg aac gtg gtc gtc gtg gct gct gaa tgt tct ccc tgg tgc aaa   1138
Val Met Asn Val Val Val Val Ala Ala Glu Cys Ser Pro Trp Cys Lys
            310             315             320

aca ggt ggt ctt gga gat gtt gcc ggt gct ttg ccc aag gct ttg gcg   1186
Thr Gly Gly Leu Gly Asp Val Ala Gly Ala Leu Pro Lys Ala Leu Ala
        325             330             335

aag aga gga cat cgt gtt atg gtt gtg gta cca agg tat ggg gac tat   1234
Lys Arg Gly His Arg Val Met Val Val Pro Arg Tyr Gly Asp Tyr
        340             345             350

gag gaa gcc tac gat gtc gga gtc cga aaa tac tac aag gct gct gga   1282
Glu Glu Ala Tyr Asp Val Gly Val Arg Lys Tyr Tyr Lys Ala Ala Gly
    355             360             365

cag gat atg gaa gtg aat tat ttc cat gct tat atc gat gga gtt gat   1330
Gln Asp Met Glu Val Asn Tyr Phe His Ala Tyr Ile Asp Gly Val Asp
370             375             380             385

ttt gtg ttc att gac gct cct ctc ttc cga cac cgc cag gaa gac att   1378
Phe Val Phe Ile Asp Ala Pro Leu Phe Arg His Arg Gln Glu Asp Ile
            390             395             400

tat ggg ggc agc aga cag gaa att atg aag cgc atg att ttg ttc tgc   1426
Tyr Gly Gly Ser Arg Gln Glu Ile Met Lys Arg Met Ile Leu Phe Cys
        405             410             415

aag gcc gct gtc gag gtt cca tgg cac gtt cca tgc ggc ggt gtc cct   1474
Lys Ala Ala Val Glu Val Pro Trp His Val Pro Cys Gly Gly Val Pro
        420             425             430

tat ggg gat gga aat ctg gtg ttt att gca aat gat tgg cac acg gca   1522
Tyr Gly Asp Gly Asn Leu Val Phe Ile Ala Asn Asp Trp His Thr Ala
        435             440             445

ctc ctg cct gtc tat ctg aaa gca tat tac agg gac cat ggt ttg atg   1570
Leu Leu Pro Val Tyr Leu Lys Ala Tyr Tyr Arg Asp His Gly Leu Met
450             455             460             465

cag tac act cgg tcc att atg gtg ata cat aac atc gct cac cag ggc   1618
Gln Tyr Thr Arg Ser Ile Met Val Ile His Asn Ile Ala His Gln Gly
            470             475             480

cgt ggc cca gta gat gag ttc ccg ttc acc gag ttg cct gag cac tac   1666
Arg Gly Pro Val Asp Glu Phe Pro Phe Thr Glu Leu Pro Glu His Tyr
            485             490             495
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ctg gaa cac ttc aga ctg tac gac ccc gtg ggt ggt gaa cac gcc aac        1714
Leu Glu His Phe Arg Leu Tyr Asp Pro Val Gly Gly Glu His Ala Asn
    500                 505                 510

tac ttc gcc gcc ggc ctg aag atg gcg gac cag gtt gtc gtc gtg agc        1762
Tyr Phe Ala Ala Gly Leu Lys Met Ala Asp Gln Val Val Val Val Ser
    515                 520                 525

ccg ggg tac ctg tgg gag ctg aag acg gtg gag ggc ggc tgg ggg ctt        1810
Pro Gly Tyr Leu Trp Glu Leu Lys Thr Val Glu Gly Gly Trp Gly Leu
530                 535                 540                 545

cac gac atc ata cgg cag aac gac tgg aag acc cgc ggc atc gtg aac        1858
His Asp Ile Ile Arg Gln Asn Asp Trp Lys Thr Arg Gly Ile Val Asn
                550                 555                 560

ggc atc gac aac atg gag tgg aac ccc gag gtg gac gtc cac ctc aag        1906
Gly Ile Asp Asn Met Glu Trp Asn Pro Glu Val Asp Val His Leu Lys
                565                 570                 575

tcg gac ggc tac acc aac ttc tcc ctg ggg acg ctg gac tcc ggc aag        1954
Ser Asp Gly Tyr Thr Asn Phe Ser Leu Gly Thr Leu Asp Ser Gly Lys
    580                 585                 590

cgg cag tgc aag gag gcc ctg cag cgg gag ctg ggc ctg cag gtc cgc        2002
Arg Gln Cys Lys Glu Ala Leu Gln Arg Glu Leu Gly Leu Gln Val Arg
    595                 600                 605

ggc gac gtg ccg ctg ctc ggc ttc atc ggg cgc ctg gac ggg cag aag        2050
Gly Asp Val Pro Leu Leu Gly Phe Ile Gly Arg Leu Asp Gly Gln Lys
610                 615                 620                 625

ggc gtg gag atc atc gcg gac gcg atg ccc tgg atc gtg agc cag gac        2098
Gly Val Glu Ile Ile Ala Asp Ala Met Pro Trp Ile Val Ser Gln Asp
                630                 635                 640

gtg cag ctg gtc atg ctg ggc acc ggg cgc cac gac ctg gag ggc atg        2146
Val Gln Leu Val Met Leu Gly Thr Gly Arg His Asp Leu Glu Gly Met
                645                 650                 655

ctg cgg cac ttc gag cgg gag cac cac gac aag gtg cgc ggg tgg gtg        2194
Leu Arg His Phe Glu Arg Glu His His Asp Lys Val Arg Gly Trp Val
                660                 665                 670

ggg ttc tcc gtg cgg ctg gcg cac cgg atc acg gcc ggc gcc gac gcg        2242
Gly Phe Ser Val Arg Leu Ala His Arg Ile Thr Ala Gly Ala Asp Ala
675                 680                 685

ctc ctc atg ccc tcc cgg ttc gag ccg tgc gga ctg aac cag ctc tac        2290
Leu Leu Met Pro Ser Arg Phe Glu Pro Cys Gly Leu Asn Gln Leu Tyr
690                 695                 700                 705

gcc atg gcc tac ggc acc gtc ccc gtc gtg cat gcc gtc ggt ggc ctg        2338
Ala Met Ala Tyr Gly Thr Val Pro Val Val His Ala Val Gly Gly Leu
                710                 715                 720

agg gac acc gtg ccg ccg ttc gac ccc ttc aac cac tcc ggg ctc ggg        2386
Arg Asp Thr Val Pro Pro Phe Asp Pro Phe Asn His Ser Gly Leu Gly
                725                 730                 735

tgg acg ttc gac cgc gca gag gcg cag aag ctg atc gag gcg ctc ggg        2434
Trp Thr Phe Asp Arg Ala Glu Ala Gln Lys Leu Ile Glu Ala Leu Gly
                740                 745                 750
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cac tgc ctc cgc acc tac cgg gac tac aag gag agc tgg agg ggg ctc       2482
His Cys Leu Arg Thr Tyr Arg Asp Tyr Lys Glu Ser Trp Arg Gly Leu
    755                 760                 765

cag gag cgc ggc atg tcg cag gac ttc agc tgg gag cat gcc gcc aag       2530
Gln Glu Arg Gly Met Ser Gln Asp Phe Ser Trp Glu His Ala Ala Lys
770                 775                 780                 785

ctc tac gag gac gtc ctc gtc aag gcc aag tac cag tgg tgaacgctag        2579
Leu Tyr Glu Asp Val Leu Val Lys Ala Lys Tyr Gln Trp
                790                 795

ctgctagccg gtccagcccc gcatgcgtgc atgacaggat ggaattgcgc attgcgcacg     2639

caggaaggtg ccatggagcg ccggcatccg cgaagtacag tgacatgagg tgtgtgtggt     2699

tgagacgctg attccgatct ggtccgtagc agagtagagc ggaggtaggg aagcgctcct     2759

tgttacaggt atatgggaat gttgttaact tggtattgta atttgttatg ttgtgtgcat     2819

tattacagag ggcaacgatc tgcgccggcg caccggccca actgttgggc cggtcgcaca     2879

gcagccgttg gatccgaccg cctgggccgt tggatcccac cgaaaaaaaa aaaaaaaaaa     2939
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            20                  25                  30

Pro His Thr Gly Ala Gly Arg Leu His Trp Pro Pro Ser Pro Pro Gln
        35                  40                  45

Arg Thr Ala Arg Asp Gly Ala Val Ala Ala Arg Ala Ala Gly Lys Lys
    50                  55                  60

Asp Ala Gly Ile Asp Asp Ala Ala Pro Ala Arg Gln Pro Arg Ala Leu
65                  70                  75                  80

Arg Gly Gly Ala Ala Thr Lys Val Ala Glu Arg Arg Asp Pro Val Lys
                85                  90                  95

Thr Leu Asp Arg Asp Ala Ala Glu Gly Gly Ala Pro Ser Pro Pro Ala
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Pro Arg Gln Glu Asp Ala Arg Leu Pro Ser Met Asn Gly Met Pro Val
        115   120   125

Asn Gly Glu Asn Lys Ser Thr Gly Gly Gly Ala Thr Lys Asp Ser
    130   135   140

Gly Leu Pro Ala Pro Ala Arg Ala Pro Gln Pro Ser Ser Gln Asn Arg
145   150   155   160

Val Pro Val Asn Gly Glu Asn Lys Ala Asn Val Ala Ser Pro Pro Thr
            165   170   175

Ser Ile Ala Glu Val Ala Ala Pro Asp Pro Ala Ala Thr Ile Ser Ile
        180   185   190

Ser Asp Lys Ala Pro Glu Ser Val Val Pro Ala Glu Lys Ala Pro Pro
    195   200   205

Ser Ser Gly Ser Asn Phe Val Pro Ser Ala Ser Ala Pro Gly Ser Asp
    210   215   220

Thr Val Ser Asp Val Glu Leu Glu Leu Lys Lys Gly Ala Val Ile Val
225   230   235   240

Lys Glu Ala Pro Asn Pro Lys Ala Leu Ser Pro Pro Ala Ala Pro Ala
            245   250   255

Val Gln Gln Asp Leu Trp Asp Phe Lys Lys Tyr Ile Gly Phe Glu Glu
            260   265   270

Pro Val Glu Ala Lys Asp Asp Gly Arg Ala Val Ala Asp Asp Ala Gly
        275   280   285

Ser Phe Glu His His Gln Asn His Asp Ser Gly Pro Leu Ala Gly Glu
    290   295   300

Asn Val Met Asn Val Val Val Val Ala Ala Glu Cys Ser Pro Trp Cys
305   310   315   320

Lys Thr Gly Gly Leu Gly Asp Val Ala Gly Ala Leu Pro Lys Ala Leu
            325   330   335

Ala Lys Arg Gly His Arg Val Met Val Val Pro Arg Tyr Gly Asp
        340   345   350

Tyr Glu Glu Ala Tyr Asp Val Gly Val Arg Lys Tyr Tyr Lys Ala Ala
    355   360   365

Gly Gln Asp Met Glu Val Asn Tyr Phe His Ala Tyr Ile Asp Gly Val
    370   375   380

Asp Phe Val Phe Ile Asp Ala Pro Leu Phe Arg His Arg Gln Glu Asp
385   390   395   400

Ile Tyr Gly Gly Ser Arg Gln Glu Ile Met Lys Arg Met Ile Leu Phe
          405   410   415

Cys Lys Ala Ala Val Glu Val Pro Trp His Val Pro Cys Gly Gly Val
        420   425   430

Pro Tyr Gly Asp Gly Asn Leu Val Phe Ile Ala Asn Asp Trp His Thr
      435   440   445

Ala Leu Leu Pro Val Tyr Leu Lys Ala Tyr Tyr Arg Asp His Gly Leu
    450   455   460

Met Gln Tyr Thr Arg Ser Ile Met Val Ile His Asn Ile Ala His Gln
465   470   475   480

Gly Arg Gly Pro Val Asp Glu Phe Pro Phe Thr Glu Leu Pro Glu His
        485   490   495

Tyr Leu Glu His Phe Arg Leu Tyr Asp Pro Val Gly Gly Glu His Ala
      500   505   510

Asn Tyr Phe Ala Ala Gly Leu Lys Met Ala Asp Gln Val Val Val Val
      515   520   525

Ser Pro Gly Tyr Leu Trp Glu Leu Lys Thr Val Glu Gly Gly Trp Gly
    530   535   540

Leu His Asp Ile Ile Arg Gln Asn Asp Trp Lys Thr Arg Gly Ile Val
545   550   555   560

Asn Gly Ile Asp Asn Met Glu Trp Asn Pro Glu Val Asp Val His Leu
        565   570   575

Lys Ser Asp Gly Tyr Thr Asn Phe Ser Leu Gly Thr Leu Asp Ser Gly
      580   585   590

Lys Arg Gln Cys Lys Glu Ala Leu Gln Arg Glu Leu Gly Leu Gln Val
      595   600   605

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Arg Gly Asp Val Pro Leu Leu Gly Phe Ile Gly Arg Leu Asp Gly Gln
    610             615             620

Lys Gly Val Glu Ile Ile Ala Asp Ala Met Pro Trp Ile Val Ser Gln
625             630             635             640

Asp Val Gln Leu Val Met Leu Gly Thr Gly Arg His Asp Leu Glu Gly
                645             650             655

Met Leu Arg His Phe Glu Arg Glu His His Asp Lys Val Arg Gly Trp
            660             665             670

Val Gly Phe Ser Val Arg Leu Ala His Arg Ile Thr Ala Gly Ala Asp
            675             680             685

Ala Leu Leu Met Pro Ser Arg Phe Glu Pro Cys Gly Leu Asn Gln Leu
    690             695             700

Tyr Ala Met Ala Tyr Gly Thr Val Pro Val Val His Ala Val Gly Gly
705             710             715             720

Leu Arg Asp Thr Val Pro Pro Phe Asp Pro Phe Asn His Ser Gly Leu
            725             730             735

Gly Trp Thr Phe Asp Arg Ala Glu Ala Gln Lys Leu Ile Glu Ala Leu
            740             745             750

Gly His Cys Leu Arg Thr Tyr Arg Asp Tyr Lys Glu Ser Trp Arg Gly
            755             760             765

Leu Gln Glu Arg Gly Met Ser Gln Asp Phe Ser Trp Glu His Ala Ala
    770             775             780

Lys Leu Tyr Glu Asp Val Leu Val Lys Ala Lys Tyr Gln Trp
785             790             795
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<213> Triticum aestivum

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<222> (89)..(2485)

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                                 Met Ser Ser Ala Val Ala Ser Ala
                                  1               5

gcg tcc ttc ctc gcg ctc gcc tcc gcc tcc ccc ggg aga tca cgc agg        160
Ala Ser Phe Leu Ala Leu Ala Ser Ala Ser Pro Gly Arg Ser Arg Arg
     10              15                  20

cgg gcg agg gtg agc gcg ccg cca ccc cac gcc ggg gcc ggc agg ctg        208
Arg Ala Arg Val Ser Ala Pro Pro Pro His Ala Gly Ala Gly Arg Leu
25                  30                  35                  40

cac tgg ccg ccg tgg ccg ccg cag cgc acg gct cgc gac gga ggt gtg        256
His Trp Pro Pro Trp Pro Pro Gln Arg Thr Ala Arg Asp Gly Gly Val
             45                  50                  55

gcc gcg cgc gcc gcc ggg aag aag gac gcg agg gtc gac gac gac gcc        304
Ala Ala Arg Ala Ala Gly Lys Lys Asp Ala Arg Val Asp Asp Asp Ala
             60                  65                  70

gcg tcc gcg agg cag ccc cgc gca cgc cgc ggt ggc gcc gcc acc aag        352
Ala Ser Ala Arg Gln Pro Arg Ala Arg Arg Gly Gly Ala Ala Thr Lys
         75                  80                  85

gtc gcg gag cgg agg gat ccc gtc aag acg ctc gat cgc gac gcc gcg        400
Val Ala Glu Arg Arg Asp Pro Val Lys Thr Leu Asp Arg Asp Ala Ala
         90                  95                  100

gaa ggt ggc gcg ccg gca ccg ccg gca ccg agg cag gac gcc gcc cgt        448
Glu Gly Gly Ala Pro Ala Pro Pro Ala Pro Arg Gln Asp Ala Ala Arg
105                 110                 115                 120

cca ccg agt atg aac ggc acg ccg gtg aac ggt gag aac aaa tct acc        496
Pro Pro Ser Met Asn Gly Thr Pro Val Asn Gly Glu Asn Lys Ser Thr
                 125                 130                 135

ggc ggc ggc ggc gcg acc aaa gac agc ggg ctg ccc gca ccc gca cgc        544
Gly Gly Gly Gly Ala Thr Lys Asp Ser Gly Leu Pro Ala Pro Ala Arg
             140                 145                 150

gcg ccc cat ccg tcg acc cag aac aga gta cca gtg aac ggt gaa aac        592
Ala Pro His Pro Ser Thr Gln Asn Arg Val Pro Val Asn Gly Glu Asn
         155                 160                 165

aaa gct aac gtc gcc tcg ccg ccg acg agc ata gcc gag gtc gtg gct        640
Lys Ala Asn Val Ala Ser Pro Pro Thr Ser Ile Ala Glu Val Val Ala
    170                 175                 180

ccg gat tcc gca gct acc att tcc atc agt gac aag gcg ccg gag tcc        688
Pro Asp Ser Ala Ala Thr Ile Ser Ile Ser Asp Lys Ala Pro Glu Ser
185                 190                 195                 200

gtt gtc cca gcc gag aag ccg ccg ccg tcg tcc ggc tca aat ttc gtg        736
Val Val Pro Ala Glu Lys Pro Pro Pro Ser Ser Gly Ser Asn Phe Val
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gtc tcg gct tct gct ccc agg ctg gac att gac agc gat gtt gaa cct        784
Val Ser Ala Ser Ala Pro Arg Leu Asp Ile Asp Ser Asp Val Glu Pro
        220             225             230

gaa ctg aag aag ggt gcg gtc atc gtc gaa gaa gct cca aac cca aag        832
Glu Leu Lys Lys Gly Ala Val Ile Val Glu Glu Ala Pro Asn Pro Lys
        235             240             245

gct ctt tcg ccg cct gca gcc ccc gct gta caa gaa gac ctt tgg gac       880
Ala Leu Ser Pro Pro Ala Ala Pro Ala Val Gln Glu Asp Leu Trp Asp
        250             255             260

ttc aag aaa tac att ggc ttc gag gag ccc gtg gag gcc aag gat gat       928
Phe Lys Lys Tyr Ile Gly Phe Glu Glu Pro Val Glu Ala Lys Asp Asp
265             270             275             280

ggc tgg gct gtt gca gat gat gcg ggc tcc ttt gaa cat cac cag aac       976
Gly Trp Ala Val Ala Asp Asp Ala Gly Ser Phe Glu His His Gln Asn
            285             290             295

cat gat tcc gga cct ttg gca ggg gag aac gtc atg aac gtg gtc gtc      1024
His Asp Ser Gly Pro Leu Ala Gly Glu Asn Val Met Asn Val Val Val
        300             305             310

gtg gct gct gaa tgt tct ccc tgg tgc aaa aca ggt ggt ctt gga gat      1072
Val Ala Ala Glu Cys Ser Pro Trp Cys Lys Thr Gly Gly Leu Gly Asp
        315             320             325

gtt gcc ggt gct ttg ccc aag gct ttg gcg aag aga gga cat cgt gtt      1120
Val Ala Gly Ala Leu Pro Lys Ala Leu Ala Lys Arg Gly His Arg Val
        330             335             340

atg gtt gtg gta cca agg tat ggg gac tat gag gaa gcc tac gat gtc      1168
Met Val Val Val Pro Arg Tyr Gly Asp Tyr Glu Glu Ala Tyr Asp Val
345             350             355             360

gga gtc cga aaa tac tac aag gct gct gga cag gat atg gaa gtg aat      1216
Gly Val Arg Lys Tyr Tyr Lys Ala Ala Gly Gln Asp Met Glu Val Asn
            365             370             375

tat ttc cat gct tat atc gat gga gtt gat ttt gtg ttc att gac gct      1264
Tyr Phe His Ala Tyr Ile Asp Gly Val Asp Phe Val Phe Ile Asp Ala
            380             385             390

cct ctc ttc cga cac cgc cag gaa gac att tat ggg ggc agc aga cag      1312
Pro Leu Phe Arg His Arg Gln Glu Asp Ile Tyr Gly Gly Ser Arg Gln
            395             400             405

gaa att atg aag cgc atg att ttg ttc tgc aag gcc gct gtc gag gtt      1360
Glu Ile Met Lys Arg Met Ile Leu Phe Cys Lys Ala Ala Val Glu Val
        410             415             420

cct tgg cac gtt cca tgc ggc ggt gtc cct tat ggg gat gga aat ctg      1408
Pro Trp His Val Pro Cys Gly Gly Val Pro Tyr Gly Asp Gly Asn Leu
425             430             435             440

gtg ttt att gca aat gat tgg cac acg gca ctc ctg cct gtc tat ctg      1456
Val Phe Ile Ala Asn Asp Trp His Thr Ala Leu Leu Pro Val Tyr Leu
            445             450             455

aaa gca tat tac agg gac cat ggt ttg atg cag tac act cgg tcc att      1504
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Lys Ala Tyr Tyr Arg Asp His Gly Leu Met Gln Tyr Thr Arg Ser Ile
            460             465                 470

atg gtg ata cat aac atc gcg cac cag ggc cgt ggc cca gta gat gaa   1552
Met Val Ile His Asn Ile Ala His Gln Gly Arg Gly Pro Val Asp Glu
            475             480                 485

ttc ccg ttc acc gag ttg cct gag cac tac ctg gaa cac ttc aga ctg   1600
Phe Pro Phe Thr Glu Leu Pro Glu His Tyr Leu Glu His Phe Arg Leu
        490             495             500

tac gac ccc gtg ggt ggt gag cac gcc aac tac ttc gcc gcc ggc ctg   1648
Tyr Asp Pro Val Gly Gly Glu His Ala Asn Tyr Phe Ala Ala Gly Leu
505             510             515                 520

aag atg gcg gac cag gtt gtc gtg gtg agc ccc ggg tac ctg tgg gag   1696
Lys Met Ala Asp Gln Val Val Val Val Ser Pro Gly Tyr Leu Trp Glu
                525             530                 535

ctc aag acg gtg gag ggc ggc tgg ggg ctt cac gac atc ata cgg cag   1744
Leu Lys Thr Val Glu Gly Gly Trp Gly Leu His Asp Ile Ile Arg Gln
            540             545             550

aac gac tgg aag acc cgc ggc atc gtc aac ggc atc gac aac atg gag   1792
Asn Asp Trp Lys Thr Arg Gly Ile Val Asn Gly Ile Asp Asn Met Glu
            555             560                 565

tgg aac ccc gag gtg gac gtc cac ctc aag tcg gac ggc tac acc aac   1840
Trp Asn Pro Glu Val Asp Val His Leu Lys Ser Asp Gly Tyr Thr Asn
        570             575             580

ttc tcc ctg ggg acg ctg gac tcc ggc aag cgg cag tgc aag gag gcc   1888
Phe Ser Leu Gly Thr Leu Asp Ser Gly Lys Arg Gln Cys Lys Glu Ala
585             590             595                 600

ctg cag cgc gag ctg ggc ctg cag gtc cgc gcc gac gtg ccg ctg ctc   1936
Leu Gln Arg Glu Leu Gly Leu Gln Val Arg Ala Asp Val Pro Leu Leu
                605             610                 615

ggc ttc atc ggc cgc ctg gac ggg cag aag ggc gtg gag atc atc gcg   1984
Gly Phe Ile Gly Arg Leu Asp Gly Gln Lys Gly Val Glu Ile Ile Ala
            620             625                 630

gac gcc atg ccc tgg atc gtg agc cag gac gtg cag ctg gtc atg ctg   2032
Asp Ala Met Pro Trp Ile Val Ser Gln Asp Val Gln Leu Val Met Leu
        635             640             645

ggc acc ggc cgc cac gac ctg gag agc atg ctg cgg cac ttc gag cgg   2080
Gly Thr Gly Arg His Asp Leu Glu Ser Met Leu Arg His Phe Glu Arg
        650             655             660

gag cac cac gac aag gtg cgc ggg tgg gtg ggg ttc tcc gtg cgc ctg   2128
Glu His His Asp Lys Val Arg Gly Trp Val Gly Phe Ser Val Arg Leu
665             670             675                 680

gcg cac cgg atc acg gcg ggc gcc gac gcg ctc ctc atg ccc tcc cgg   2176
Ala His Arg Ile Thr Ala Gly Ala Asp Ala Leu Leu Met Pro Ser Arg
                685             690                 695

ttc gag ccg tgc ggg ttg aac cag ctt tac gcc atg gcc tac ggc acc   2224
Phe Glu Pro Cys Gly Leu Asn Gln Leu Tyr Ala Met Ala Tyr Gly Thr
            700             705             710
```

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gtc ccc gtc gtg cac gcc gtc ggc ggg gtg agg gac acc gtg ccg ccg        2272
Val Pro Val Val His Ala Val Gly Gly Val Arg Asp Thr Val Pro Pro
        715                 720                 725

ttc gac ccc ttc aac cac tcc ggc ctc ggg tgg acg ttc gac cgc gcc        2320
Phe Asp Pro Phe Asn His Ser Gly Leu Gly Trp Thr Phe Asp Arg Ala
        730                 735                 740

gag gcg cac aag ctg atc gag gcg ctc ggg cac tgc ctc cgc acc tac        2368
Glu Ala His Lys Leu Ile Glu Ala Leu Gly His Cys Leu Arg Thr Tyr
745                 750                 755                 760

cgg gac tac aag gag agc tgg agg ggc ctc cag gag cgc ggc atg tcg        2416
Arg Asp Tyr Lys Glu Ser Trp Arg Gly Leu Gln Glu Arg Gly Met Ser
                765                 770                 775

cag gac ttc agc tgg gag cat gcc gcc aag ctc tac gag gac gtc ctc        2464
Gln Asp Phe Ser Trp Glu His Ala Ala Lys Leu Tyr Glu Asp Val Leu
                780                 785                 790

ctc aag gcc aag tac cag tgg tgaacgctag ctgctagccg ctccagcccc          2515
Leu Lys Ala Lys Tyr Gln Trp
                795

gcatgcgtgc atgcatgaga gggtggaact gcgcattgcg cccgcaggaa cgtgccatcc      2575

ttctcgatgg gagcgccggc atccgcgagg tgcagtgaca tgagaggtgt gtgtggttga      2635

gacgctgatt ccgatctcga tctggtccgt agcagagtag agcggacgta gggaagcgct      2695

ccttgttgca ggtatatggg aatgttgtca acttggtatt gtagtttgct atgttgtatg      2755

cgttattaca atgttgttac ttattcttgt taagtcggag gcaaagggcg aaagctagct      2815

cacatgaaaa aaaaaaaaaa aaaaaaa                                          2842
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<210> 4

<211> 799

<212> PRT

<213> Triticum aestivum

<400> 4

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Met Ser Ser Ala Val Ala Ser Ala Ala Ser Phe Leu Ala Leu Ala Ser
1               5                   10                  15


Ala Ser Pro Gly Arg Ser Arg Arg Ala Arg Val Ser Ala Pro Pro
            20                  25                  30


Pro His Ala Gly Ala Gly Arg Leu His Trp Pro Pro Trp Pro Pro Gln
            35                  40                  45


Arg Thr Ala Arg Asp Gly Gly Val Ala Ala Arg Ala Ala Gly Lys Lys
    50                  55                  60
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Asp Ala Arg Val Asp Asp Asp Ala Ala Ser Ala Arg Gln Pro Arg Ala
65   70   75   80

Arg Arg Gly Gly Ala Ala Thr Lys Val Ala Glu Arg Arg Asp Pro Val
            85   90   95

Lys Thr Leu Asp Arg Asp Ala Ala Glu Gly Gly Ala Pro Ala Pro Pro
            100   105   110

Ala Pro Arg Gln Asp Ala Ala Arg Pro Pro Ser Met Asn Gly Thr Pro
            115   120   125

Val Asn Gly Glu Asn Lys Ser Thr Gly Gly Gly Ala Thr Lys Asp
    130   135   140

Ser Gly Leu Pro Ala Pro Ala Arg Ala Pro His Pro Ser Thr Gln Asn
145   150   155   160

Arg Val Pro Val Asn Gly Glu Asn Lys Ala Asn Val Ala Ser Pro Pro
            165   170   175

Thr Ser Ile Ala Glu Val Val Ala Pro Asp Ser Ala Ala Thr Ile Ser
            180   185   190

Ile Ser Asp Lys Ala Pro Glu Ser Val Val Pro Ala Glu Lys Pro Pro
            195   200   205

Pro Ser Ser Gly Ser Asn Phe Val Val Ser Ala Ser Ala Pro Arg Leu
    210   215   220

Asp Ile Asp Ser Asp Val Glu Pro Glu Leu Lys Lys Gly Ala Val Ile
225   230   235   240

Val Glu Glu Ala Pro Asn Pro Lys Ala Leu Ser Pro Pro Ala Ala Pro
            245   250   255

Ala Val Gln Glu Asp Leu Trp Asp Phe Lys Lys Tyr Ile Gly Phe Glu
            260   265   270

Glu Pro Val Glu Ala Lys Asp Asp Gly Trp Ala Val Ala Asp Asp Ala
            275   280   285

Gly Ser Phe Glu His His Gln Asn His Asp Ser Gly Pro Leu Ala Gly
    290   295   300

Glu Asn Val Met Asn Val Val Val Val Ala Ala Glu Cys Ser Pro Trp

305   310   315   320

Cys Lys Thr Gly Gly Leu Gly Asp Val Ala Gly Ala Leu Pro Lys Ala
                325   330   335

Leu Ala Lys Arg Gly His Arg Val Met Val Val Val Pro Arg Tyr Gly
            340   345   350

Asp Tyr Glu Glu Ala Tyr Asp Val Gly Val Arg Lys Tyr Tyr Lys Ala
            355   360   365

Ala Gly Gln Asp Met Glu Val Asn Tyr Phe His Ala Tyr Ile Asp Gly
        370   375   380

Val Asp Phe Val Phe Ile Asp Ala Pro Leu Phe Arg His Arg Gln Glu
385   390   395   400

Asp Ile Tyr Gly Gly Ser Arg Gln Glu Ile Met Lys Arg Met Ile Leu
                405   410   415

Phe Cys Lys Ala Ala Val Glu Val Pro Trp His Val Pro Cys Gly Gly
            420   425   430

Val Pro Tyr Gly Asp Gly Asn Leu Val Phe Ile Ala Asn Asp Trp His
            435   440   445

Thr Ala Leu Leu Pro Val Tyr Leu Lys Ala Tyr Tyr Arg Asp His Gly
        450   455   460

Leu Met Gln Tyr Thr Arg Ser Ile Met Val Ile His Asn Ile Ala His
465   470   475   480

Gln Gly Arg Gly Pro Val Asp Glu Phe Pro Phe Thr Glu Leu Pro Glu
                485   490   495

His Tyr Leu Glu His Phe Arg Leu Tyr Asp Pro Val Gly Gly Glu His
                500   505   510

Ala Asn Tyr Phe Ala Ala Gly Leu Lys Met Ala Asp Gln Val Val Val
            515   520   525

Val Ser Pro Gly Tyr Leu Trp Glu Leu Lys Thr Val Glu Gly Gly Trp
530   535   540

Gly Leu His Asp Ile Ile Arg Gln Asn Asp Trp Lys Thr Arg Gly Ile
545   550   555   560

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Val Asn Gly Ile Asp Asn Met Glu Trp Asn Pro Glu Val Asp Val His
            565   570   575

Leu Lys Ser Asp Gly Tyr Thr Asn Phe Ser Leu Gly Thr Leu Asp Ser
            580   585   590

Gly Lys Arg Gln Cys Lys Glu Ala Leu Gln Arg Glu Leu Gly Leu Gln
            595   600   605

Val Arg Ala Asp Val Pro Leu Leu Gly Phe Ile Gly Arg Leu Asp Gly
    610   615   620

Gln Lys Gly Val Glu Ile Ile Ala Asp Ala Met Pro Trp Ile Val Ser
625   630   635   640

Gln Asp Val Gln Leu Val Met Leu Gly Thr Gly Arg His Asp Leu Glu
            645   650   655

Ser Met Leu Arg His Phe Glu Arg Glu His His Asp Lys Val Arg Gly
            660   665   670

Trp Val Gly Phe Ser Val Arg Leu Ala His Arg Ile Thr Ala Gly Ala
    675   680   685

Asp Ala Leu Leu Met Pro Ser Arg Phe Glu Pro Cys Gly Leu Asn Gln
    690   695   700

Leu Tyr Ala Met Ala Tyr Gly Thr Val Pro Val Val His Ala Val Gly
705   710   715   720

Gly Val Arg Asp Thr Val Pro Pro Phe Asp Pro Phe Asn His Ser Gly
            725   730   735

Leu Gly Trp Thr Phe Asp Arg Ala Glu Ala His Lys Leu Ile Glu Ala
            740   745   750

Leu Gly His Cys Leu Arg Thr Tyr Arg Asp Tyr Lys Glu Ser Trp Arg
            755   760   765

Gly Leu Gln Glu Arg Gly Met Ser Gln Asp Phe Ser Trp Glu His Ala
    770   775   780

Ala Lys Leu Tyr Glu Asp Val Leu Leu Lys Ala Lys Tyr Gln Trp
785   790   795

<210> 5

<211> 2107

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<212> DNA

<213> Triticum aestivum

<220>

<221> CDS

<222> (1)..(1791)

<223>

<400> 5

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Pro Ala Glu Lys Thr Pro Pro Ser Ser Gly Ser Asn Phe Glu Ser Ser
1               5                   10                  15

gcc tct gct ccc ggg tct gac act gtc agc gac gtg gaa caa gaa ctg    96
Ala Ser Ala Pro Gly Ser Asp Thr Val Ser Asp Val Glu Gln Glu Leu
                20                  25                  30

aag aag ggt gcg gtc gtt gtc gaa gaa gct cca aag cca aag gct ctt    144
Lys Lys Gly Ala Val Val Val Glu Glu Ala Pro Lys Pro Lys Ala Leu
            35                  40                  45

tcg ccg cct gca gcc ccc gct gta caa gaa gac ctt tgg gat ttc aag    192
Ser Pro Pro Ala Ala Pro Ala Val Gln Glu Asp Leu Trp Asp Phe Lys
        50                  55                  60

aaa tac att ggt ttc gag gag ccc gtg gag gcc aag gat gat ggc cgg    240
Lys Tyr Ile Gly Phe Glu Glu Pro Val Glu Ala Lys Asp Asp Gly Arg
65                  70                  75                  80

gct gtc gca gat gat gcg ggc tcc ttt gaa cac cac cag aat cac gac    288
Ala Val Ala Asp Asp Ala Gly Ser Phe Glu His His Gln Asn His Asp
                85                  90                  95

tcc gga cct ttg gca ggg gag aat gtc atg aac gtg gtc gtc gtg gct    336
Ser Gly Pro Leu Ala Gly Glu Asn Val Met Asn Val Val Val Val Ala
            100                 105                 110

gct gag tgt tct ccc tgg tgc aaa aca ggt ggt ctg gga gat gtt gcg    384
Ala Glu Cys Ser Pro Trp Cys Lys Thr Gly Gly Leu Gly Asp Val Ala
            115                 120                 125

ggt gct ctg ccc aag gct ttg gca aag aga gga cat cgt gtt atg gtt    432
Gly Ala Leu Pro Lys Ala Leu Ala Lys Arg Gly His Arg Val Met Val
        130                 135                 140

gtg gta cca agg tat ggg gac tat gaa gaa cct acg gat gtc gga gtc    480
Val Val Pro Arg Tyr Gly Asp Tyr Glu Glu Pro Thr Asp Val Gly Val
145                 150                 155                 160

cga aaa tac tac aag gct gct gga cag gat atg gaa gtg aat tat ttc    528
Arg Lys Tyr Tyr Lys Ala Ala Gly Gln Asp Met Glu Val Asn Tyr Phe
                165                 170                 175

cat gct tat atc gat gga gtt gat ttt gtg ttc att gac gct cct ctc    576
```
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```
His Ala Tyr Ile Asp Gly Val Asp Phe Val Phe Ile Asp Ala Pro Leu
        180                 185             190

ttc cga cac cga gag gaa gac att tat ggg ggc agc aga cag gaa att      624
Phe Arg His Arg Glu Glu Asp Ile Tyr Gly Gly Ser Arg Gln Glu Ile
        195                 200             205

atg aag cgc atg att ttg ttc tgc aag gcc gct gtt gag gtt cca tgg      672
Met Lys Arg Met Ile Leu Phe Cys Lys Ala Ala Val Glu Val Pro Trp
210                 215             220

cac gtt cca tgc ggc ggt gtc cct tat ggg gat gga aat ctg gtg ttt      720
His Val Pro Cys Gly Gly Val Pro Tyr Gly Asp Gly Asn Leu Val Phe
225                 230             235             240

att gca aat gat tgg cac acg gca ctc ctg cct gtc tat ctg aaa gca      768
Ile Ala Asn Asp Trp His Thr Ala Leu Leu Pro Val Tyr Leu Lys Ala
            245             250             255

tat tac agg gac cat ggt ttg atg cag tac act cgg tcc att atg gtg      816
Tyr Tyr Arg Asp His Gly Leu Met Gln Tyr Thr Arg Ser Ile Met Val
        260                 265             270

ata cat aac atc gct cac cag ggc cgt ggc cct gta gat gaa ttc ccg      864
Ile His Asn Ile Ala His Gln Gly Arg Gly Pro Val Asp Glu Phe Pro
        275                 280             285

ttc acc gag ttg cct gag cac tac ctg gaa cac ttc aga ctg tac gac      912
Phe Thr Glu Leu Pro Glu His Tyr Leu Glu His Phe Arg Leu Tyr Asp
290                 295             300

ccc gtg ggt ggt gaa cac gcc aac tac ttc gcc gcc ggc ctg aag atg      960
Pro Val Gly Gly Glu His Ala Asn Tyr Phe Ala Ala Gly Leu Lys Met
305                 310             315             320

gcg gac cag gtt gtc gtg gtg agc ccc ggg tac ctg tgg gag ctg aag     1008
Ala Asp Gln Val Val Val Val Ser Pro Gly Tyr Leu Trp Glu Leu Lys
            325             330             335

acg gtg gag ggc ggc tgg ggg ctt cac gac atc ata cgg cag aac gac     1056
Thr Val Glu Gly Gly Trp Gly Leu His Asp Ile Ile Arg Gln Asn Asp
        340                 345             350

tgg aag acc cgc ggc atc gtc aac ggc atc gac aac atg gag tgg aac     1104
Trp Lys Thr Arg Gly Ile Val Asn Gly Ile Asp Asn Met Glu Trp Asn
        355                 360             365

ccc gag gtg gac gcc cac ctc aag tcg gac ggc tac acc aac ttc tcc     1152
Pro Glu Val Asp Ala His Leu Lys Ser Asp Gly Tyr Thr Asn Phe Ser
370                 375             380

ctg agg acg ctg gac tcc ggc aag cgg cag tgc aag gag gcc ctg cag     1200
Leu Arg Thr Leu Asp Ser Gly Lys Arg Gln Cys Lys Glu Ala Leu Gln
385                 390             395             400

cgc gag ctg ggc ctg cag gtc cgc gcc gac gtg ccg ctg ctc ggc ttc     1248
Arg Glu Leu Gly Leu Gln Val Arg Ala Asp Val Pro Leu Leu Gly Phe
            405             410             415

atc ggc cgc ctg gac ggg cag aag ggc gtg gag atc atc gcg gac gcc     1296
Ile Gly Arg Leu Asp Gly Gln Lys Gly Val Glu Ile Ile Ala Asp Ala
            420             425             430
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atg ccc tgg atc gtg agc cag gac gtg cag ctg gtg atg ctg ggc acc      1344
Met Pro Trp Ile Val Ser Gln Asp Val Gln Leu Val Met Leu Gly Thr
        435                 440                 445

ggg cgc cac gac ctg gag agc atg ctg cag cac ttc gag cgg gag cac      1392
Gly Arg His Asp Leu Glu Ser Met Leu Gln His Phe Glu Arg Glu His
        450                 455                 460

cac gac aag gtg cgc ggg tgg gtg ggg ttc tcc gtg cgc ctg gcg cac      1440
His Asp Lys Val Arg Gly Trp Val Gly Phe Ser Val Arg Leu Ala His
465                 470                 475                 480

cgg atc acg gcg ggg gcg gac gcg ctc ctc atg ccc tcc cgg ttc gtg      1488
Arg Ile Thr Ala Gly Ala Asp Ala Leu Leu Met Pro Ser Arg Phe Val
                485                 490                 495

ccg tgc ggg ctg aac cag ctc tac gcc atg gcc tac ggc acc gtc ccc      1536
Pro Cys Gly Leu Asn Gln Leu Tyr Ala Met Ala Tyr Gly Thr Val Pro
            500                 505                 510

gtc gtg cac gcc gtc ggc ggc ctc agg gac acc gtg ccg ccg ttc gac      1584
Val Val His Ala Val Gly Gly Leu Arg Asp Thr Val Pro Pro Phe Asp
            515                 520                 525

ccc ttc aac cac tcc ggg ctc ggg tgg acg ttc gac cgc gcc gag gcg      1632
Pro Phe Asn His Ser Gly Leu Gly Trp Thr Phe Asp Arg Ala Glu Ala
        530                 535                 540

cac aag ctg atc gag gcg ctc ggg cac tgc ctc cgc acc tac cga gac      1680
His Lys Leu Ile Glu Ala Leu Gly His Cys Leu Arg Thr Tyr Arg Asp
545                 550                 555                 560

ttc aag gag agc tgg agg gcc ctc cag gag cgc ggc atg tcg cag gac      1728
Phe Lys Glu Ser Trp Arg Ala Leu Gln Glu Arg Gly Met Ser Gln Asp
                565                 570                 575

ttc agc tgg gag cac gcc gcc aag ctc tac gag gac gtc ctc gtc aag      1776
Phe Ser Trp Glu His Ala Ala Lys Leu Tyr Glu Asp Val Leu Val Lys
            580                 585                 590

gcc aag tac cag tgg tgaacgctag ctgctagccg ctccagcccc gcatgcgtgc      1831
Ala Lys Tyr Gln Trp
        595

atgacaggat ggaactgcat tgcgcacgca ggaaagtgcc atggagcgcc ggcatccgcg      1891

aagtacagtg acatgaggtg tgtgtggttg agacgctgat tccaatccgg cccgtagcag      1951

agtagagcgg aggtatatgg gaatcttaac ttggtattgt aatttgttat gttgtgtgca      2011

ttattacaat gttgttactt attcttgtta agtcggaggc caagggcgaa agctagctca      2071

catgtctgat ggatgcaaaa aaaaaaaaaa aaaaaa                                 2107
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<211> 597

<212> PRT

<213> Triticum aestivum

<400> 6

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Pro Ala Glu Lys Thr Pro Pro Ser Ser Gly Ser Asn Phe Glu Ser Ser
1           5               10              15

Ala Ser Ala Pro Gly Ser Asp Thr Val Ser Asp Val Glu Gln Glu Leu
            20              25              30

Lys Lys Gly Ala Val Val Val Glu Glu Ala Pro Lys Pro Lys Ala Leu
            35              40              45

Ser Pro Pro Ala Ala Pro Ala Val Gln Glu Asp Leu Trp Asp Phe Lys
    50              55              60

Lys Tyr Ile Gly Phe Glu Glu Pro Val Glu Ala Lys Asp Asp Gly Arg
65              70              75              80

Ala Val Ala Asp Asp Ala Gly Ser Phe Glu His His Gln Asn His Asp
            85              90              95

Ser Gly Pro Leu Ala Gly Glu Asn Val Met Asn Val Val Val Val Ala
            100             105             110

Ala Glu Cys Ser Pro Trp Cys Lys Thr Gly Gly Leu Gly Asp Val Ala
        115             120             125

Gly Ala Leu Pro Lys Ala Leu Ala Lys Arg Gly His Arg Val Met Val
    130             135             140

Val Val Pro Arg Tyr Gly Asp Tyr Glu Glu Pro Thr Asp Val Gly Val
145             150             155             160

Arg Lys Tyr Tyr Lys Ala Ala Gly Gln Asp Met Glu Val Asn Tyr Phe
                165             170             175

His Ala Tyr Ile Asp Gly Val Asp Phe Val Phe Ile Asp Ala Pro Leu
            180             185             190

Phe Arg His Arg Glu Glu Asp Ile Tyr Gly Gly Ser Arg Gln Glu Ile
        195             200             205

Met Lys Arg Met Ile Leu Phe Cys Lys Ala Ala Val Glu Val Pro Trp
    210             215             220

His Val Pro Cys Gly Gly Val Pro Tyr Gly Asp Gly Asn Leu Val Phe
225             230             235             240
```

```
Ile Ala Asn Asp Trp His Thr Ala Leu Leu Pro Val Tyr Leu Lys Ala
            245             250             255


Tyr Tyr Arg Asp His Gly Leu Met Gln Tyr Thr Arg Ser Ile Met Val
            260             265             270


Ile His Asn Ile Ala His Gln Gly Arg Gly Pro Val Asp Glu Phe Pro
            275             280             285


Phe Thr Glu Leu Pro Glu His Tyr Leu Glu His Phe Arg Leu Tyr Asp
    290             295             300


Pro Val Gly Gly Glu His Ala Asn Tyr Phe Ala Ala Gly Leu Lys Met
305             310             315             320


Ala Asp Gln Val Val Val Val Ser Pro Gly Tyr Leu Trp Glu Leu Lys
            325             330             335


Thr Val Glu Gly Gly Trp Gly Leu His Asp Ile Ile Arg Gln Asn Asp
            340             345             350


Trp Lys Thr Arg Gly Ile Val Asn Gly Ile Asp Asn Met Glu Trp Asn
            355             360             365


Pro Glu Val Asp Ala His Leu Lys Ser Asp Gly Tyr Thr Asn Phe Ser
    370             375             380


Leu Arg Thr Leu Asp Ser Gly Lys Arg Gln Cys Lys Glu Ala Leu Gln
385             390             395             400


Arg Glu Leu Gly Leu Gln Val Arg Ala Asp Val Pro Leu Leu Gly Phe
            405             410             415


Ile Gly Arg Leu Asp Gly Gln Lys Gly Val Glu Ile Ile Ala Asp Ala
            420             425             430


Met Pro Trp Ile Val Ser Gln Asp Val Gln Leu Val Met Leu Gly Thr
            435             440             445


Gly Arg His Asp Leu Glu Ser Met Leu Gln His Phe Glu Arg Glu His
    450             455             460


His Asp Lys Val Arg Gly Trp Val Gly Phe Ser Val Arg Leu Ala His
465             470             475             480


Arg Ile Thr Ala Gly Ala Asp Ala Leu Leu Met Pro Ser Arg Phe Val
            485             490             495
```

```
Pro Cys Gly Leu Asn Gln Leu Tyr Ala Met Ala Tyr Gly Thr Val Pro
            500                 505                 510

Val Val His Ala Val Gly Gly Leu Arg Asp Thr Val Pro Pro Phe Asp
            515                 520                 525

Pro Phe Asn His Ser Gly Leu Gly Trp Thr Phe Asp Arg Ala Glu Ala
            530                 535                 540

His Lys Leu Ile Glu Ala Leu Gly His Cys Leu Arg Thr Tyr Arg Asp
545                 550                 555                 560

Phe Lys Glu Ser Trp Arg Ala Leu Gln Glu Arg Gly Met Ser Gln Asp
                565                 570                 575

Phe Ser Trp Glu His Ala Ala Lys Leu Tyr Glu Asp Val Leu Val Lys
            580                 585                 590

Ala Lys Tyr Gln Trp
            595
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<210> 7

<211> 5346

<212> DNA

<213> Triticum aestivum

<220>

<221> CDS

<222> (29)..(4912)

<223>


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                                Met Glu Met Ser Leu Trp Pro Arg
                                 1               5

agc ccc ctg tgc cct cgg agc agg cag ccg ctc gtc gtc gtc cgg ccg      100
Ser Pro Leu Cys Pro Arg Ser Arg Gln Pro Leu Val Val Val Arg Pro
    10                  15                  20

gcc ggc cgc ggc ggc ctc acg cag cct ttt ttg atg aat ggc aga ttt     148
Ala Gly Arg Gly Gly Leu Thr Gln Pro Phe Leu Met Asn Gly Arg Phe
25                  30                  35                  40
```

```
act cga agc agg acc ctt cga tgc atg gta gca agt tca gat cct cct        196
Thr Arg Ser Arg Thr Leu Arg Cys Met Val Ala Ser Ser Asp Pro Pro
            45              50              55

aat agg aaa tca aga agg atg gta cca cct cag gtt aaa gtc att tct        244
Asn Arg Lys Ser Arg Arg Met Val Pro Pro Gln Val Lys Val Ile Ser
            60              65              70

tct aga gga tat acg aca aga ctc att gtt gaa cca agc aac gag aat        292
Ser Arg Gly Tyr Thr Thr Arg Leu Ile Val Glu Pro Ser Asn Glu Asn
            75              80              85

aca gaa cac aat aat cgg gat gaa gaa act ctt gat aca tac aat gcg        340
Thr Glu His Asn Asn Arg Asp Glu Glu Thr Leu Asp Thr Tyr Asn Ala
            90              95             100

cta tta agt acc gag aca gca gaa tgg aca gat aat aga gaa gcc gag        388
Leu Leu Ser Thr Glu Thr Ala Glu Trp Thr Asp Asn Arg Glu Ala Glu
105             110             115             120

act gct aaa gcg gac tcg tcg caa aat gct tta agc agt tct ata att        436
Thr Ala Lys Ala Asp Ser Ser Gln Asn Ala Leu Ser Ser Ser Ile Ile
            125             130             135

ggg gaa gtg gat gtg gcg gat gaa gat ata ctt gcg gct gat ctg aca        484
Gly Glu Val Asp Val Ala Asp Glu Asp Ile Leu Ala Ala Asp Leu Thr
            140             145             150

gtg tat tca ttg agc agt gta atg aag aag gaa gtg gat gca gcg gac        532
Val Tyr Ser Leu Ser Ser Val Met Lys Lys Glu Val Asp Ala Ala Asp
            155             160             165

aaa gct aga gtt aaa gaa gac gca ttt gag ctg gat ttg cca gca act        580
Lys Ala Arg Val Lys Glu Asp Ala Phe Glu Leu Asp Leu Pro Ala Thr
170             175             180

aca ttg aga agt gtg ata gta gat gtg atg gat cat aat ggg act gta        628
Thr Leu Arg Ser Val Ile Val Asp Val Met Asp His Asn Gly Thr Val
185             190             195             200

caa gag aca ttg aga agt gtg ata gta gat gtg atg gat cat aat ggg        676
Gln Glu Thr Leu Arg Ser Val Ile Val Asp Val Met Asp His Asn Gly
            205             210             215

act gta caa gag aca ttg aga agt gtg ata gta gat gtg atg gat gat        724
Thr Val Gln Glu Thr Leu Arg Ser Val Ile Val Asp Val Met Asp Asp
            220             225             230

gcg gcg gac aaa gct aga gtt gaa gaa gac gta ttt gag ctg gat ttg        772
Ala Ala Asp Lys Ala Arg Val Glu Glu Asp Val Phe Glu Leu Asp Leu
            235             240             245

tca gga aat att tca agc agt gcg acg acc gtg gaa cta gat gcg gtt        820
Ser Gly Asn Ile Ser Ser Ser Ala Thr Thr Val Glu Leu Asp Ala Val
            250             255             260

gac gaa gtc ggg cct gtt caa gac aaa ttt gag gcg acc tca tca gga        868
Asp Glu Val Gly Pro Val Gln Asp Lys Phe Glu Ala Thr Ser Ser Gly
265             270             275             280

aat gtt tca aac agt gca acg gta cgg gaa gtg gat gca agt gat gaa        916
Asn Val Ser Asn Ser Ala Thr Val Arg Glu Val Asp Ala Ser Asp Glu
            285             290             295
```

```
gct ggg aat gat caa ggc ata ttt aga gca gat ttg tca gga aat gtt    964
Ala Gly Asn Asp Gln Gly Ile Phe Arg Ala Asp Leu Ser Gly Asn Val
            300                 305                 310

ttt tca agc agt aca aca gtg gaa gtg ggt gca gtg gat gaa gct ggg    1012
Phe Ser Ser Ser Thr Thr Val Glu Val Gly Ala Val Asp Glu Ala Gly
            315                 320                 325

tct ata aag gac agg ttt gag acg gat tcg tca gga aat gtt tca aca    1060
Ser Ile Lys Asp Arg Phe Glu Thr Asp Ser Ser Gly Asn Val Ser Thr
            330                 335                 340

agt gcg ccg atg tgg gat gca att gat gaa acc gtg gct gat caa gac    1108
Ser Ala Pro Met Trp Asp Ala Ile Asp Glu Thr Val Ala Asp Gln Asp
345                 350                 355                 360

aca ttt gag gcg gat ttg tcg gga aat gct tca agc tgc gca aca tac    1156
Thr Phe Glu Ala Asp Leu Ser Gly Asn Ala Ser Ser Cys Ala Thr Tyr
                    365                 370                 375

aga gaa gtg gat gat gtg gtg gat gaa act aga tca gaa gag gaa aca    1204
Arg Glu Val Asp Asp Val Val Asp Glu Thr Arg Ser Glu Glu Glu Thr
                380                 385                 390

ttt gca atg gat ttg ttt gca agt gaa tca ggc cat gag aaa cat atg    1252
Phe Ala Met Asp Leu Phe Ala Ser Glu Ser Gly His Glu Lys His Met
            395                 400                 405

gca gtg gat tat gtg ggt gaa gct acc gat gaa gaa gag act tac caa    1300
Ala Val Asp Tyr Val Gly Glu Ala Thr Asp Glu Glu Glu Thr Tyr Gln
            410                 415                 420

cag caa tat cca gta ccg tct tca ttc tct atg tgg gac aag gct att    1348
Gln Gln Tyr Pro Val Pro Ser Ser Phe Ser Met Trp Asp Lys Ala Ile
425                 430                 435                 440

gct aaa aca ggt gta agt ttg aat cct gag ctg cga ctt gtc agg gtt    1396
Ala Lys Thr Gly Val Ser Leu Asn Pro Glu Leu Arg Leu Val Arg Val
                    445                 450                 455

gaa gaa caa ggc aaa gta aat ttt agt gat aaa aaa gac ctg tca att    1444
Glu Glu Gln Gly Lys Val Asn Phe Ser Asp Lys Lys Asp Leu Ser Ile
                460                 465                 470

gat gat tta cca gga caa aac caa tcg atc att ggt tcc tat aaa caa    1492
Asp Asp Leu Pro Gly Gln Asn Gln Ser Ile Ile Gly Ser Tyr Lys Gln
            475                 480                 485

gat aaa tca att gct gat gtt gcg gga ccg acc caa tca att ttt ggt    1540
Asp Lys Ser Ile Ala Asp Val Ala Gly Pro Thr Gln Ser Ile Phe Gly
            490                 495                 500

tct agt aaa caa cac cgg tca att gtt gct ttc ccc aaa caa aac cag    1588
Ser Ser Lys Gln His Arg Ser Ile Val Ala Phe Pro Lys Gln Asn Gln
505                 510                 515                 520

tca att gtt agt gtc act gag caa aag cag tcc ata gtt gga ttc cgt    1636
Ser Ile Val Ser Val Thr Glu Gln Lys Gln Ser Ile Val Gly Phe Arg
                    525                 530                 535

agt caa gat ctt tcg gct gtt agt ctc cct aaa caa aac gta cca att    1684
Ser Gln Asp Leu Ser Ala Val Ser Leu Pro Lys Gln Asn Val Pro Ile
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gtt ggt acg tcg aga gag ggt caa aca aag caa gtt cct gtt gtt gat     1732
Val Gly Thr Ser Arg Glu Gly Gln Thr Lys Gln Val Pro Val Val Asp
        555                 560                 565

aga cag gat gca ttg tat gtg aat gga ctg gaa gct aag gag gga gat     1780
Arg Gln Asp Ala Leu Tyr Val Asn Gly Leu Glu Ala Lys Glu Gly Asp
    570                 575                 580

cac aca tcc gag aaa act gat gag gat gcg ctt cat gta aag ttt aat     1828
His Thr Ser Glu Lys Thr Asp Glu Asp Ala Leu His Val Lys Phe Asn
585                 590                 595                 600

gtt gac aat gtg ttg cgg aag cat cag gca gat aga acc caa gca gtg     1876
Val Asp Asn Val Leu Arg Lys His Gln Ala Asp Arg Thr Gln Ala Val
                605                 610                 615

gaa aag aaa act tgg aag aaa gtt gat gag gaa cat ctt tac atg act     1924
Glu Lys Lys Thr Trp Lys Lys Val Asp Glu Glu His Leu Tyr Met Thr
                620                 625                 630

gaa cat cag aaa cgt gct gcc gaa gga cag atg gta gtt aac gag gat     1972
Glu His Gln Lys Arg Ala Ala Glu Gly Gln Met Val Val Asn Glu Asp
        635                 640                 645

gag ctt tct ata act gaa att gga atg ggg aga ggt gat aaa att cag     2020
Glu Leu Ser Ile Thr Glu Ile Gly Met Gly Arg Gly Asp Lys Ile Gln
    650                 655                 660

cat gtg ctt tct gag gaa gag ctt tca tgg tct gaa gat gaa gtg cag     2068
His Val Leu Ser Glu Glu Glu Leu Ser Trp Ser Glu Asp Glu Val Gln
665                 670                 675                 680

tta att gag gat gat gga caa tat gaa gtt gac gag acc tct gtg tcc     2116
Leu Ile Glu Asp Asp Gly Gln Tyr Glu Val Asp Glu Thr Ser Val Ser
                685                 690                 695

gtt aac gtt gaa caa gat atc cag ggg tca cca cag gat gtt gtg gat     2164
Val Asn Val Glu Gln Asp Ile Gln Gly Ser Pro Gln Asp Val Val Asp
                700                 705                 710

ccg caa gca cta aag gtg atg ctg caa gaa ctc gct gag aaa aat tat     2212
Pro Gln Ala Leu Lys Val Met Leu Gln Glu Leu Ala Glu Lys Asn Tyr
        715                 720                 725

tcg atg agg aac aag ctg ttt gtt ttt cca gag gta gtg aaa gct gat     2260
Ser Met Arg Asn Lys Leu Phe Val Phe Pro Glu Val Val Lys Ala Asp
    730                 735                 740

tca gtt att gat ctt tat tta aat cgt gac cta aca gct ttg gcg aat     2308
Ser Val Ile Asp Leu Tyr Leu Asn Arg Asp Leu Thr Ala Leu Ala Asn
745                 750                 755                 760

gaa ccc gat gtc gtc atc aaa gga gca ttc aat ggt tgg aaa tgg agg     2356
Glu Pro Asp Val Val Ile Lys Gly Ala Phe Asn Gly Trp Lys Trp Arg
                765                 770                 775

ctt ttc act gaa aga ttg cac aag agt gac ctt gga ggg gtt tgg tgg     2404
Leu Phe Thr Glu Arg Leu His Lys Ser Asp Leu Gly Gly Val Trp Trp
                780                 785                 790

tct tgc aaa ctg tac ata ccc aag gag gcc tac aga tta gac ttt gtg     2452
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Ser Cys Lys Leu Tyr Ile Pro Lys Glu Ala Tyr Arg Leu Asp Phe Val
    795                 800                 805

ttc ttc aac ggt cgc acg gtc tat gag aac aat ggc aac aat gat ttc    2500
Phe Phe Asn Gly Arg Thr Val Tyr Glu Asn Asn Gly Asn Asn Asp Phe
    810                 815                 820

tgt ata gga ata gaa ggc act atg aat gaa gat ctg ttt gag gat ttc    2548
Cys Ile Gly Ile Glu Gly Thr Met Asn Glu Asp Leu Phe Glu Asp Phe
825                 830                 835                 840

ttg gtt aaa gaa aag caa agg gag ctt gag aaa ctt gcc atg gaa gaa    2596
Leu Val Lys Glu Lys Gln Arg Glu Leu Glu Lys Leu Ala Met Glu Glu
                845                 850                 855

gct gaa agg agg aca cag act gaa gaa cag cgg cga aga aag gaa gca    2644
Ala Glu Arg Arg Thr Gln Thr Glu Glu Gln Arg Arg Arg Lys Glu Ala
                860                 865                 870

agg gct gca gat gaa gct gtc agg gca caa gcg aag gcc gag ata gag    2692
Arg Ala Ala Asp Glu Ala Val Arg Ala Gln Ala Lys Ala Glu Ile Glu
                875                 880                 885

atc aag aag aaa aaa ttg caa agt atg ttg agt ttg gcc aga aca tgt    2740
Ile Lys Lys Lys Lys Leu Gln Ser Met Leu Ser Leu Ala Arg Thr Cys
    890                 895                 900

gtt gat aat ttg tgg tac ata gag gct agc aca gat aca aga gga gat    2788
Val Asp Asn Leu Trp Tyr Ile Glu Ala Ser Thr Asp Thr Arg Gly Asp
905                 910                 915                 920

act atc agg tta tat tat aac aga aac tcg agg cca ctt gcg cat agt    2836
Thr Ile Arg Leu Tyr Tyr Asn Arg Asn Ser Arg Pro Leu Ala His Ser
                925                 930                 935

act gag att tgg atg cat ggt ggt tac aac aat tgg aca gat gga ctc    2884
Thr Glu Ile Trp Met His Gly Gly Tyr Asn Asn Trp Thr Asp Gly Leu
                940                 945                 950

tct att gtt gaa agc ttt gtc aag tgc aat gac aaa gac ggc gat tgg    2932
Ser Ile Val Glu Ser Phe Val Lys Cys Asn Asp Lys Asp Gly Asp Trp
                955                 960                 965

tgg tat gca gat gtt att cca cct gaa aag gca ctt gtg ttg gac tgg    2980
Trp Tyr Ala Asp Val Ile Pro Pro Glu Lys Ala Leu Val Leu Asp Trp
    970                 975                 980

gtt ttt gct gat ggg cca gct ggg aat gca agg aac tat gac aac aat    3028
Val Phe Ala Asp Gly Pro Ala Gly Asn Ala Arg Asn Tyr Asp Asn Asn
985                 990                 995                 1000

gct cga caa gat ttc  cat gct att ctt ccg  aac aac aat gta acc    3073
Ala Arg Gln Asp Phe  His Ala Ile Leu Pro  Asn Asn Asn Val Thr
                1005                1010                1015

gag gaa ggc ttc tgg  gcg caa gag gag caa  aac atc tat aca agg    3118
Glu Glu Gly Phe Trp  Ala Gln Glu Glu Gln  Asn Ile Tyr Thr Arg
                1020                1025                1030

ctt ctg caa gaa agg  aga gaa aag gaa gaa  acc atg aaa aga aag    3163
Leu Leu Gln Glu Arg  Arg Glu Lys Glu Glu  Thr Met Lys Arg Lys
                1035                1040                1045
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gct gag aga agt gca   aat atc aaa gct gag   atg aag gca aaa act        3208
Ala Glu Arg Ser Ala   Asn Ile Lys Ala Glu   Met Lys Ala Lys Thr
            1050                1055                          1060

atg cga agg ttt ctg   ctt tcc cag aaa cac   att gtt tat acc gaa        3253
Met Arg Arg Phe Leu   Leu Ser Gln Lys His   Ile Val Tyr Thr Glu
            1065                1070                          1075

ccg ctt gaa ata cgt   gcc gga acc aca gtg   gat gtg cta tac aat        3298
Pro Leu Glu Ile Arg   Ala Gly Thr Thr Val   Asp Val Leu Tyr Asn
            1080                1085                          1090

ccc tct aac aca gtg   cta aat gga aag tcg   gag ggt tgg ttt aga        3343
Pro Ser Asn Thr Val   Leu Asn Gly Lys Ser   Glu Gly Trp Phe Arg
            1095                1100                          1105

tgc tcc ttt aac ctt   tgg atg cat tca agt   ggg gca ttg cca ccc        3388
Cys Ser Phe Asn Leu   Trp Met His Ser Ser   Gly Ala Leu Pro Pro
            1110                1115                          1120

cag aag atg gtg aaa   tca ggg gat ggg ccg   ctc tta aaa gca aca        3433
Gln Lys Met Val Lys   Ser Gly Asp Gly Pro   Leu Leu Lys Ala Thr
            1125                1130                          1135

gtt gat gtt cca ccg   gat gcc tat atg atg   gac ttt gtt ttc tcc        3478
Val Asp Val Pro Pro   Asp Ala Tyr Met Met   Asp Phe Val Phe Ser
            1140                1145                          1150

gag tgg gaa gaa gat   ggg atc tat gac aac   agg aat ggg atg gac        3523
Glu Trp Glu Glu Asp   Gly Ile Tyr Asp Asn   Arg Asn Gly Met Asp
            1155                1160                          1165

tat cat att cct gtt   tct gat tca att gaa   aca gag aat tac atg        3568
Tyr His Ile Pro Val   Ser Asp Ser Ile Glu   Thr Glu Asn Tyr Met
            1170                1175                          1180

cgt att atc cac att   gcc gtt gag atg gcc   ccc gtt gca aag gtt        3613
Arg Ile Ile His Ile   Ala Val Glu Met Ala   Pro Val Ala Lys Val
            1185                1190                          1195

gga ggt ctt ggg gat   gtt gtt aca agt ctt   tca cgt gcc att caa        3658
Gly Gly Leu Gly Asp   Val Val Thr Ser Leu   Ser Arg Ala Ile Gln
            1200                1205                          1210

gat cta gga cat act   gtc gag gtt att ctc   ccg aag tac gac tgt        3703
Asp Leu Gly His Thr   Val Glu Val Ile Leu   Pro Lys Tyr Asp Cys
            1215                1220                          1225

ttg aac caa agc agt   gtc aag gat tta cat   tta tat caa agt ttt        3748
Leu Asn Gln Ser Ser   Val Lys Asp Leu His   Leu Tyr Gln Ser Phe
            1230                1235                          1240

tct tgg ggt ggt aca   gaa ata aaa gta tgg   gtt gga cga gtc gaa        3793
Ser Trp Gly Gly Thr   Glu Ile Lys Val Trp   Val Gly Arg Val Glu
            1245                1250                          1255

gac ctg acc gtt tac   ttc ctg gaa cct caa   aat ggg atg ttt ggc        3838
Asp Leu Thr Val Tyr   Phe Leu Glu Pro Gln   Asn Gly Met Phe Gly
            1260                1265                          1270

gtt gga tgt gta tat   gga agg aat gat gac   cgc aga ttt ggg ttc        3883
Val Gly Cys Val Tyr   Gly Arg Asn Asp Asp   Arg Arg Phe Gly Phe
            1275                1280                          1285
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ttc tgt cat tct gct  cta gag ttt atc ctc  cag aat gaa ttt tct      3928
Phe Cys His Ser Ala  Leu Glu Phe Ile Leu  Gln Asn Glu Phe Ser
            1290                   1295                   1300

cca cat ata ata cat  tgc cat gat tgg tca  agt gct ccg gtc gcc      3973
Pro His Ile Ile His  Cys His Asp Trp Ser  Ser Ala Pro Val Ala
            1305                   1310                   1315

tgg cta tat aag gaa  cac tat tcc caa tcc  aga atg gca agc act      4018
Trp Leu Tyr Lys Glu  His Tyr Ser Gln Ser  Arg Met Ala Ser Thr
            1320                   1325                   1330

cgg gtt gta ttt acc  atc cac aat ctt gaa  ttt gga gca cat tat      4063
Arg Val Val Phe Thr  Ile His Asn Leu Glu  Phe Gly Ala His Tyr
            1335                   1340                   1345

att ggt aaa gca atg  aca tac tgt gat aaa  gcc aca act gtt tct      4108
Ile Gly Lys Ala Met  Thr Tyr Cys Asp Lys  Ala Thr Thr Val Ser
            1350                   1355                   1360

cct aca tat tca agg  gac gtg gca ggc cat  ggc gcc att gct cct      4153
Pro Thr Tyr Ser Arg  Asp Val Ala Gly His  Gly Ala Ile Ala Pro
            1365                   1370                   1375

cat cgt gag aaa ttc  tac ggc att ctc aat  gga att gat cca gat      4198
His Arg Glu Lys Phe  Tyr Gly Ile Leu Asn  Gly Ile Asp Pro Asp
            1380                   1385                   1390

atc tgg gat ccg tac  act gac aat ttt atc  ccg gtc cct tat act      4243
Ile Trp Asp Pro Tyr  Thr Asp Asn Phe Ile  Pro Val Pro Tyr Thr
            1395                   1400                   1405

tgt gag aat gtt gtc  gaa ggc aag aga gct  gca aaa agg gcc ttg      4288
Cys Glu Asn Val Val  Glu Gly Lys Arg Ala  Ala Lys Arg Ala Leu
            1410                   1415                   1420

cag cag aag ttt gga  tta cag caa act gat  gtc cct att gtc gga      4333
Gln Gln Lys Phe Gly  Leu Gln Gln Thr Asp  Val Pro Ile Val Gly
            1425                   1430                   1435

atc atc acc cgt ctg  aca gcc cag aag gga  atc cac ctc atc aag      4378
Ile Ile Thr Arg Leu  Thr Ala Gln Lys Gly  Ile His Leu Ile Lys
            1440                   1445                   1450

cac gca att cac cga  act ctc gaa agc aac  gga cat gtg gtt ttg      4423
His Ala Ile His Arg  Thr Leu Glu Ser Asn  Gly His Val Val Leu
            1455                   1460                   1465

ctt ggt tca gct cca  gat cat cga ata caa  ggc gat ttt tgc aga      4468
Leu Gly Ser Ala Pro  Asp His Arg Ile Gln  Gly Asp Phe Cys Arg
            1470                   1475                   1480

ttg gcc gat gct ctt  cat ggt gtt tac cat  ggt agg gtg aag ctt      4513
Leu Ala Asp Ala Leu  His Gly Val Tyr His  Gly Arg Val Lys Leu
            1485                   1490                   1495

gtt cta acc tat gat  gag cct ctt tct cac  ctg ata tac gct ggc      4558
Val Leu Thr Tyr Asp  Glu Pro Leu Ser His  Leu Ile Tyr Ala Gly
            1500                   1505                   1510

tcg gac ttc ata att  gtt cct tca atc ttc  gaa ccc tgt ggc tta      4603
Ser Asp Phe Ile Ile  Val Pro Ser Ile Phe  Glu Pro Cys Gly Leu
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                 1515                    1520                    1525
aca caa ctt gtt gcc  atg cgt tat gga tcg  atc cct ata gtt cgg       4648
Thr Gln Leu Val Ala  Met Arg Tyr Gly Ser  Ile Pro Ile Val Arg
                 1530                    1535                    1540

aaa act gga gga ctt  cac gac aca gtc ttc  gac gta gac aat gat       4693
Lys Thr Gly Gly Leu  His Asp Thr Val Phe  Asp Val Asp Asn Asp
                 1545                    1550                    1555

aag gac cgg gct cgg  tct ctt ggt ctt gaa  cca aat ggg ttc agt       4738
Lys Asp Arg Ala Arg  Ser Leu Gly Leu Glu  Pro Asn Gly Phe Ser
                 1560                    1565                    1570

ttc gac gga gcc gac  agc aat ggc gtg gat  tat gcc ctc aac aga       4783
Phe Asp Gly Ala Asp  Ser Asn Gly Val Asp  Tyr Ala Leu Asn Arg
                 1575                    1580                    1585

gca atc ggc gct tgg  ttc gat gcc cgt gat  tgg ttc cac tcc ctg       4828
Ala Ile Gly Ala Trp  Phe Asp Ala Arg Asp  Trp Phe His Ser Leu
                 1590                    1595                    1600

tgt aag agg gtc atg  gag caa gac tgg tcg  tgg aac cgg ccc gca       4873
Cys Lys Arg Val Met  Glu Gln Asp Trp Ser  Trp Asn Arg Pro Ala
                 1605                    1610                    1615

ctg gac tac att gaa  ttg tac cat gcc gct  cga aaa ttc tgacacccaa    4922
Leu Asp Tyr Ile Glu  Leu Tyr His Ala Ala  Arg Lys Phe
                 1620                    1625

ctgaaccaat gacaagaaca agcgcattgt gggatcgact agtcatacag ggctgtgcag   4982

atcgtcttgc ttcagttagt gccctcttca gttagttcca agcgcactac agtcgtacat   5042

agctgaggat cctcttgcct cctaccaggg ggaacaaagc agaaatgcat gagtgcattg   5102

ggaagacttt tatgtatatt gttaaaaaaa tttccttttc ttttccttcc ctgcacctgg   5162

aaatggttaa gcgcatcgcc gagataagaa ccgcagtgac attctgtgag tagctttgta   5222

tattctctca tcttgtgaaa actaatgttc atgttaggct gtctgatcat gtggaagctt   5282

tgttatatgt tacttatggt atacatcaat gatatttaca tttgtggaaa aaaaaaaaaa   5342

aaaa                                                                5346
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<210> 8

<211> 1628

<212> PRT

<213> Triticum aestivum

<400> 8

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Met Glu Met Ser Leu Trp Pro Arg Ser Pro Leu Cys Pro Arg Ser Arg
1               5                   10                  15
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Gln Pro Leu Val Val Val Arg Pro Ala Gly Arg Gly Gly Leu Thr Gln
            20              25              30

Pro Phe Leu Met Asn Gly Arg Phe Thr Arg Ser Arg Thr Leu Arg Cys
            35              40              45

Met Val Ala Ser Ser Asp Pro Pro Asn Arg Lys Ser Arg Arg Met Val
    50              55              60

Pro Pro Gln Val Lys Val Ile Ser Ser Arg Gly Tyr Thr Thr Arg Leu
65              70              75              80

Ile Val Glu Pro Ser Asn Glu Asn Thr Glu His Asn Asn Arg Asp Glu
            85              90              95

Glu Thr Leu Asp Thr Tyr Asn Ala Leu Leu Ser Thr Glu Thr Ala Glu
            100             105             110

Trp Thr Asp Asn Arg Glu Ala Glu Thr Ala Lys Ala Asp Ser Ser Gln
            115             120             125

Asn Ala Leu Ser Ser Ser Ile Ile Gly Glu Val Asp Val Ala Asp Glu
    130             135             140

Asp Ile Leu Ala Ala Asp Leu Thr Val Tyr Ser Leu Ser Ser Val Met
145             150             155             160

Lys Lys Glu Val Asp Ala Ala Asp Lys Ala Arg Val Lys Glu Asp Ala
            165             170             175

Phe Glu Leu Asp Leu Pro Ala Thr Thr Leu Arg Ser Val Ile Val Asp
            180             185             190

Val Met Asp His Asn Gly Thr Val Gln Glu Thr Leu Arg Ser Val Ile
    195             200             205

Val Asp Val Met Asp His Asn Gly Thr Val Gln Glu Thr Leu Arg Ser
    210             215             220

Val Ile Val Asp Val Met Asp Asp Ala Ala Asp Lys Ala Arg Val Glu
225             230             235             240

Glu Asp Val Phe Glu Leu Asp Leu Ser Gly Asn Ile Ser Ser Ser Ala
            245             250             255

Thr Thr Val Glu Leu Asp Ala Val Asp Glu Val Gly Pro Val Gln Asp
            260             265             270
```

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Lys Phe Glu Ala Thr Ser Ser Gly Asn Val Ser Asn Ser Ala Thr Val
        275   280   285

Arg Glu Val Asp Ala Ser Asp Glu Ala Gly Asn Asp Gln Gly Ile Phe
    290   295   300

Arg Ala Asp Leu Ser Gly Asn Val Phe Ser Ser Ser Thr Thr Val Glu
305   310   315   320

Val Gly Ala Val Asp Glu Ala Gly Ser Ile Lys Asp Arg Phe Glu Thr
                325   330   335

Asp Ser Ser Gly Asn Val Ser Thr Ser Ala Pro Met Trp Asp Ala Ile
            340   345   350

Asp Glu Thr Val Ala Asp Gln Asp Thr Phe Glu Ala Asp Leu Ser Gly
        355   360   365

Asn Ala Ser Ser Cys Ala Thr Tyr Arg Glu Val Asp Asp Val Val Asp
    370   375   380

Glu Thr Arg Ser Glu Glu Glu Thr Phe Ala Met Asp Leu Phe Ala Ser
385   390   395   400

Glu Ser Gly His Glu Lys His Met Ala Val Asp Tyr Val Gly Glu Ala
            405   410   415

Thr Asp Glu Glu Glu Thr Tyr Gln Gln Gln Tyr Pro Val Pro Ser Ser
        420   425   430

Phe Ser Met Trp Asp Lys Ala Ile Ala Lys Thr Gly Val Ser Leu Asn
        435   440   445

Pro Glu Leu Arg Leu Val Arg Val Glu Glu Gln Gly Lys Val Asn Phe
    450   455   460

Ser Asp Lys Lys Asp Leu Ser Ile Asp Asp Leu Pro Gly Gln Asn Gln
465   470   475   480

Ser Ile Ile Gly Ser Tyr Lys Gln Asp Lys Ser Ile Ala Asp Val Ala
            485   490   495

Gly Pro Thr Gln Ser Ile Phe Gly Ser Ser Lys Gln His Arg Ser Ile
        500   505   510

Val Ala Phe Pro Lys Gln Asn Gln Ser Ile Val Ser Val Thr Glu Gln
    515   520   525

Lys Gln Ser Ile Val Gly Phe Arg Ser Gln Asp Leu Ser Ala Val Ser
    530   535   540

Leu Pro Lys Gln Asn Val Pro Ile Val Gly Thr Ser Arg Glu Gly Gln
545   550   555   560

Thr Lys Gln Val Pro Val Val Asp Arg Gln Asp Ala Leu Tyr Val Asn
                565   570   575

Gly Leu Glu Ala Lys Glu Gly Asp His Thr Ser Glu Lys Thr Asp Glu
            580   585   590

Asp Ala Leu His Val Lys Phe Asn Val Asp Asn Val Leu Arg Lys His
        595   600   605

Gln Ala Asp Arg Thr Gln Ala Val Glu Lys Lys Thr Trp Lys Lys Val
    610   615   620

Asp Glu Glu His Leu Tyr Met Thr Glu His Gln Lys Arg Ala Ala Glu
625   630   635   640

Gly Gln Met Val Val Asn Glu Asp Glu Leu Ser Ile Thr Glu Ile Gly
                645   650   655

Met Gly Arg Gly Asp Lys Ile Gln His Val Leu Ser Glu Glu Glu Leu
            660   665   670

Ser Trp Ser Glu Asp Glu Val Gln Leu Ile Glu Asp Asp Gly Gln Tyr
        675   680   685

Glu Val Asp Glu Thr Ser Val Ser Val Asn Val Glu Gln Asp Ile Gln
    690   695   700

Gly Ser Pro Gln Asp Val Val Asp Pro Gln Ala Leu Lys Val Met Leu
705   710   715   720

Gln Glu Leu Ala Glu Lys Asn Tyr Ser Met Arg Asn Lys Leu Phe Val
            725   730   735

Phe Pro Glu Val Val Lys Ala Asp Ser Val Ile Asp Leu Tyr Leu Asn
            740   745   750

Arg Asp Leu Thr Ala Leu Ala Asn Glu Pro Asp Val Val Ile Lys Gly
        755   760   765

Ala Phe Asn Gly Trp Lys Trp Arg Leu Phe Thr Glu Arg Leu His Lys

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          770                     775                     780
```

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Ser Asp Leu Gly Gly Val Trp Trp Ser Cys Lys Leu Tyr Ile Pro Lys
785                 790                 795                 800
```

```
Glu Ala Tyr Arg Leu Asp Phe Val Phe Phe Asn Gly Arg Thr Val Tyr
                805                 810                 815
```

```
Glu Asn Asn Gly Asn Asn Asp Phe Cys Ile Gly Ile Glu Gly Thr Met
            820                 825                 830
```

```
Asn Glu Asp Leu Phe Glu Asp Phe Leu Val Lys Glu Lys Gln Arg Glu
        835                 840                 845
```

```
Leu Glu Lys Leu Ala Met Glu Glu Ala Glu Arg Arg Thr Gln Thr Glu
    850                 855                 860
```

```
Glu Gln Arg Arg Arg Lys Glu Ala Arg Ala Ala Asp Glu Ala Val Arg
865                 870                 875                 880
```

```
Ala Gln Ala Lys Ala Glu Ile Glu Ile Lys Lys Lys Lys Leu Gln Ser
                885                 890                 895
```

```
Met Leu Ser Leu Ala Arg Thr Cys Val Asp Asn Leu Trp Tyr Ile Glu
            900                 905                 910
```

```
Ala Ser Thr Asp Thr Arg Gly Asp Thr Ile Arg Leu Tyr Tyr Asn Arg
        915                 920                 925
```

```
Asn Ser Arg Pro Leu Ala His Ser Thr Glu Ile Trp Met His Gly Gly
    930                 935                 940
```

```
Tyr Asn Asn Trp Thr Asp Gly Leu Ser Ile Val Glu Ser Phe Val Lys
945                 950                 955                 960
```

```
Cys Asn Asp Lys Asp Gly Asp Trp Trp Tyr Ala Asp Val Ile Pro Pro
                965                 970                 975
```

```
Glu Lys Ala Leu Val Leu Asp Trp Val Phe Ala Asp Gly Pro Ala Gly
            980                 985                 990
```

```
Asn Ala Arg Asn Tyr Asp Asn Asn Ala Arg Gln Asp Phe His Ala Ile
        995                 1000                1005
```

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Leu Pro Asn Asn Asn Val Thr Glu Glu Gly Phe Trp Ala Gln Glu
    1010                1015                1020
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Glu Gln Asn Ile Tyr Thr Arg Leu Leu Gln Glu Arg Arg Glu Lys
    1025   1030   1035

Glu Glu Thr Met Lys Arg Lys Ala Glu Arg Ser Ala Asn Ile Lys
    1040   1045   1050

Ala Glu Met Lys Ala Lys Thr Met Arg Arg Phe Leu Leu Ser Gln
    1055   1060   1065

Lys His Ile Val Tyr Thr Glu Pro Leu Glu Ile Arg Ala Gly Thr
    1070   1075   1080

Thr Val Asp Val Leu Tyr Asn Pro Ser Asn Thr Val Leu Asn Gly
    1085   1090   1095

Lys Ser Glu Gly Trp Phe Arg Cys Ser Phe Asn Leu Trp Met His
    1100   1105   1110

Ser Ser Gly Ala Leu Pro Pro Gln Lys Met Val Lys Ser Gly Asp
    1115   1120   1125

Gly Pro Leu Leu Lys Ala Thr Val Asp Val Pro Pro Asp Ala Tyr
    1130   1135   1140

Met Met Asp Phe Val Phe Ser Glu Trp Glu Glu Asp Gly Ile Tyr
    1145   1150   1155

Asp Asn Arg Asn Gly Met Asp Tyr His Ile Pro Val Ser Asp Ser
    1160   1165   1170

Ile Glu Thr Glu Asn Tyr Met Arg Ile Ile His Ile Ala Val Glu
    1175   1180   1185

Met Ala Pro Val Ala Lys Val Gly Gly Leu Gly Asp Val Val Thr
    1190   1195   1200

Ser Leu Ser Arg Ala Ile Gln Asp Leu Gly His Thr Val Glu Val
    1205   1210   1215

Ile Leu Pro Lys Tyr Asp Cys Leu Asn Gln Ser Ser Val Lys Asp
    1220   1225   1230

Leu His Leu Tyr Gln Ser Phe Ser Trp Gly Gly Thr Glu Ile Lys
    1235   1240   1245

Val Trp Val Gly Arg Val Glu Asp Leu Thr Val Tyr Phe Leu Glu
    1250   1255   1260

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Pro Gln Asn Gly Met Phe Gly Val Gly Cys Val Tyr Gly Arg Asn
   1265   1270   1275

Asp Asp Arg Arg Phe Gly Phe Phe Cys His Ser Ala Leu Glu Phe
   1280   1285   1290

Ile Leu Gln Asn Glu Phe Ser Pro His Ile Ile His Cys His Asp
   1295   1300   1305

Trp Ser Ser Ala Pro Val Ala Trp Leu Tyr Lys Glu His Tyr Ser
   1310   1315   1320

Gln Ser Arg Met Ala Ser Thr Arg Val Val Phe Thr Ile His Asn
   1325   1330   1335

Leu Glu Phe Gly Ala His Tyr Ile Gly Lys Ala Met Thr Tyr Cys
   1340   1345   1350

Asp Lys Ala Thr Thr Val Ser Pro Thr Tyr Ser Arg Asp Val Ala
   1355   1360   1365

Gly His Gly Ala Ile Ala Pro His Arg Glu Lys Phe Tyr Gly Ile
   1370   1375   1380

Leu Asn Gly Ile Asp Pro Asp Ile Trp Asp Pro Tyr Thr Asp Asn
   1385   1390   1395

Phe Ile Pro Val Pro Tyr Thr Cys Glu Asn Val Val Glu Gly Lys
   1400   1405   1410

Arg Ala Ala Lys Arg Ala Leu Gln Gln Lys Phe Gly Leu Gln Gln
   1415   1420   1425

Thr Asp Val Pro Ile Val Gly Ile Ile Thr Arg Leu Thr Ala Gln
   1430   1435   1440

Lys Gly Ile His Leu Ile Lys His Ala Ile His Arg Thr Leu Glu
   1445   1450   1455

Ser Asn Gly His Val Val Leu Leu Gly Ser Ala Pro Asp His Arg
   1460   1465   1470

Ile Gln Gly Asp Phe Cys Arg Leu Ala Asp Ala Leu His Gly Val
   1475   1480   1485

Tyr His Gly Arg Val Lys Leu Val Leu Thr Tyr Asp Glu Pro Leu
   1490   1495   1500

Ser His Leu Ile Tyr Ala Gly Ser Asp Phe Ile Ile Val Pro Ser
    1505   1510   1515

Ile Phe Glu Pro Cys Gly Leu Thr Gln Leu Val Ala Met Arg Tyr
    1520   1525   1530

Gly Ser Ile Pro Ile Val Arg Lys Thr Gly Gly Leu His Asp Thr
    1535   1540   1545

Val Phe Asp Val Asp Asn Asp Lys Asp Arg Ala Arg Ser Leu Gly
    1550   1555   1560

Leu Glu Pro Asn Gly Phe Ser Phe Asp Gly Ala Asp Ser Asn Gly
    1565   1570   1575

Val Asp Tyr Ala Leu Asn Arg Ala Ile Gly Ala Trp Phe Asp Ala
    1580   1585   1590

Arg Asp Trp Phe His Ser Leu Cys Lys Arg Val Met Glu Gln Asp
    1595   1600   1605

Trp Ser Trp Asn Arg Pro Ala Leu Asp Tyr Ile Glu Leu Tyr His
    1610   1615   1620

Ala Ala Arg Lys Phe
    1625

<210> 9

<211> 3621

<212> DNA

<213> Triticum aestivum

<220>

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<222> (1)..(3177)

<223>

<220>

<221> misc_feature

<222> (1520)..(1520)

<223> n can be a or g or c or t, and the encoded amino acid cannot be a
       ssigned with certainty.

<400> 9

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gat gca ttg tat gtg aat gga ctg gaa gct aag gag gga gat cac aca        48
Asp Ala Leu Tyr Val Asn Gly Leu Glu Ala Lys Glu Gly Asp His Thr
1               5                   10                  15

tcc gag aaa act gat gag gat gcg ctt cat gta aag ttt aat gtt gac        96
Ser Glu Lys Thr Asp Glu Asp Ala Leu His Val Lys Phe Asn Val Asp
                20                  25                  30

aat gtg ttg cgg aag cat cag gca gat aga acc caa gca gtg gaa aag       144
Asn Val Leu Arg Lys His Gln Ala Asp Arg Thr Gln Ala Val Glu Lys
            35                  40                  45

aaa act tgg aag aaa gtt gat gag gaa cat ctt tac atg act gaa cat       192
Lys Thr Trp Lys Lys Val Asp Glu Glu His Leu Tyr Met Thr Glu His
        50                  55                  60

cag aaa cgt gct gcc gaa gga cag atg gta gtt aac gag gat gag ctt       240
Gln Lys Arg Ala Ala Glu Gly Gln Met Val Val Asn Glu Asp Glu Leu
65                  70                  75                  80

tct ata act gaa att gga atg ggg aga ggt gat aaa att cag cat gtg       288
Ser Ile Thr Glu Ile Gly Met Gly Arg Gly Asp Lys Ile Gln His Val
                85                  90                  95

ctt tct gag gaa gag ctt tca tgg tct gaa gat gaa gtg cag tta att       336
Leu Ser Glu Glu Glu Leu Ser Trp Ser Glu Asp Glu Val Gln Leu Ile
                100                 105                 110

gag gat gat gga caa tat gaa gtt gac gag acc tct gtg tcc gtt aac       384
Glu Asp Asp Gly Gln Tyr Glu Val Asp Glu Thr Ser Val Ser Val Asn
            115                 120                 125

gtt gaa caa gat atc cag ggg tca cca cag gat gtt gtg gat ccg caa       432
Val Glu Gln Asp Ile Gln Gly Ser Pro Gln Asp Val Val Asp Pro Gln
        130                 135                 140

gca cta aag gtg atg ctg caa gaa ctc gct gag aaa aat tat tcg atg       480
Ala Leu Lys Val Met Leu Gln Glu Leu Ala Glu Lys Asn Tyr Ser Met
145                 150                 155                 160

agg aac aag ctg ttt gtt ttt cca gag gta gtg aaa gct gat tca gtt       528
Arg Asn Lys Leu Phe Val Phe Pro Glu Val Val Lys Ala Asp Ser Val
                165                 170                 175

att gat ctt tat tta aat cgt gac cta aca gct ttg gcg aat gaa ccc       576
Ile Asp Leu Tyr Leu Asn Arg Asp Leu Thr Ala Leu Ala Asn Glu Pro
                180                 185                 190

gat gtc gtc atc aaa gga gca ttc aat ggt tgg aaa tgg agg ctt ttc       624
Asp Val Val Ile Lys Gly Ala Phe Asn Gly Trp Lys Trp Arg Leu Phe
                195                 200                 205

act gaa aga ttg cac aag agt gac ctt gga ggg gtt tgg tgg tct tgc       672
Thr Glu Arg Leu His Lys Ser Asp Leu Gly Gly Val Trp Trp Ser Cys
210                 215                 220
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aaa ctg tac ata ccc aag gag gcc tac aga tta gac ttt gtg ttc ttc      720
Lys Leu Tyr Ile Pro Lys Glu Ala Tyr Arg Leu Asp Phe Val Phe Phe
225             230             235             240

aac ggt cgc acg gtc tat gag aac aat ggc aac aat gat ttc tgt ata      768
Asn Gly Arg Thr Val Tyr Glu Asn Asn Gly Asn Asn Asp Phe Cys Ile
            245             250             255

gga ata gaa ggc act atg aat gaa gat ctg ttt gag gat ttc ttg gtt      816
Gly Ile Glu Gly Thr Met Asn Glu Asp Leu Phe Glu Asp Phe Leu Val
        260             265             270

aaa gaa aag caa agg gag ctt gag aaa ctt gcc atg gaa gaa gct gaa      864
Lys Glu Lys Gln Arg Glu Leu Glu Lys Leu Ala Met Glu Glu Ala Glu
        275             280             285

agg agg aca cag act gaa gaa cag cgg cga aga aag gaa gca agg gct      912
Arg Arg Thr Gln Thr Glu Glu Gln Arg Arg Arg Lys Glu Ala Arg Ala
        290             295             300

gca gat gaa gct gtc agg gca caa gcg aag gcc gag ata gag atc aag      960
Ala Asp Glu Ala Val Arg Ala Gln Ala Lys Ala Glu Ile Glu Ile Lys
305             310             315             320

aag aaa aaa ttg caa agt atg ttg agt ttg gcc aga aca tgt gtt gat     1008
Lys Lys Lys Leu Gln Ser Met Leu Ser Leu Ala Arg Thr Cys Val Asp
                325             330             335

aat ttg tgg tac ata gag gct agc aca gat aca aga gga gat act atc     1056
Asn Leu Trp Tyr Ile Glu Ala Ser Thr Asp Thr Arg Gly Asp Thr Ile
            340             345             350

agg tta tat tat aac aga aac tcg agg cca ctt gcg cat agt act gag     1104
Arg Leu Tyr Tyr Asn Arg Asn Ser Arg Pro Leu Ala His Ser Thr Glu
            355             360             365

att tgg atg cat ggt ggt tac aac aat tgg tca gat gga ctc tct att     1152
Ile Trp Met His Gly Gly Tyr Asn Asn Trp Ser Asp Gly Leu Ser Ile
        370             375             380

gtt gaa agc ttt gtc aag tgc aat gac aaa gac ggc gat tgg tgg tat     1200
Val Glu Ser Phe Val Lys Cys Asn Asp Lys Asp Gly Asp Trp Trp Tyr
385             390             395             400

gca gat gtt att cca cct gaa aag gca ctt gtg ttg gac tgg gtt ttt     1248
Ala Asp Val Ile Pro Pro Glu Lys Ala Leu Val Leu Asp Trp Val Phe
                405             410             415

gct gat ggg cca gct ggg aat gca agg aac tat gac aac aat gct cga     1296
Ala Asp Gly Pro Ala Gly Asn Ala Arg Asn Tyr Asp Asn Asn Ala Arg
                420             425             430

caa gat ttc cat gct att ctt ccg aac aac aat gta acc gag gaa ggc     1344
Gln Asp Phe His Ala Ile Leu Pro Asn Asn Asn Val Thr Glu Glu Gly
            435             440             445

ttc tgg gcg caa gag gag caa aac atc tat aca agg ctt ctg caa gaa     1392
Phe Trp Ala Gln Glu Glu Gln Asn Ile Tyr Thr Arg Leu Leu Gln Glu
        450             455             460

agg aga gaa aag gaa gaa acc atg aaa aga aag gct gag aga agt gca     1440
Arg Arg Glu Lys Glu Glu Thr Met Lys Arg Lys Ala Glu Arg Ser Ala
465             470             475             480
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aat atc aaa gct gag atg aag gca aaa act atg cga agg ttt ctg ctt      1488
Asn Ile Lys Ala Glu Met Lys Ala Lys Thr Met Arg Arg Phe Leu Leu
            485             490                 495

tcc cag aaa cac att gtt tat acc cga acc gnc ttg aaa tac gtg ccc      1536
Ser Gln Lys His Ile Val Tyr Thr Arg Thr Xaa Leu Lys Tyr Val Pro
            500             505                 510

gga acc aca gtg gat gtg cta tac aat ccc tct aac aca gtg cta aat      1584
Gly Thr Thr Val Asp Val Leu Tyr Asn Pro Ser Asn Thr Val Leu Asn
            515             520             525

gga aag tcg gag ggt tgg ttt aga tgc tcc ttt aac ctt tgg atg cat      1632
Gly Lys Ser Glu Gly Trp Phe Arg Cys Ser Phe Asn Leu Trp Met His
            530             535             540

tca agt ggg gca ttg cca ccc cag aag atg gtg aaa tca ggg gat ggg      1680
Ser Ser Gly Ala Leu Pro Pro Gln Lys Met Val Lys Ser Gly Asp Gly
545             550             555             560

ccg ctc tta aaa gca aca gtt gat gtt cca ccg gat gcc tat atg atg      1728
Pro Leu Leu Lys Ala Thr Val Asp Val Pro Pro Asp Ala Tyr Met Met
            565             570             575

gac ttt gtt ttc tcc gag tgg gaa gaa gat ggg atc tat gac aac agg      1776
Asp Phe Val Phe Ser Glu Trp Glu Glu Asp Gly Ile Tyr Asp Asn Arg
            580             585             590

aat ggg atg gac tat cat att cct gtt tct gat tca att gaa aca gag      1824
Asn Gly Met Asp Tyr His Ile Pro Val Ser Asp Ser Ile Glu Thr Glu
            595             600             605

aat tac atg cgt att atc cac att gcc gtt gag atg gcc ccc gtt gca      1872
Asn Tyr Met Arg Ile Ile His Ile Ala Val Glu Met Ala Pro Val Ala
610             615             620

aag gtt gga ggt ctt ggg gat gtt gtt aca agt ctt tca cgt gcc att      1920
Lys Val Gly Gly Leu Gly Asp Val Val Thr Ser Leu Ser Arg Ala Ile
625             630             635             640

caa gat cta gga cat act gtc gag gtt att ctc ccg aag tac gac tgt      1968
Gln Asp Leu Gly His Thr Val Glu Val Ile Leu Pro Lys Tyr Asp Cys
            645             650             655

ttg aac caa agc agt gtc aag gat tta cat tta tat caa agt ttt tct      2016
Leu Asn Gln Ser Ser Val Lys Asp Leu His Leu Tyr Gln Ser Phe Ser
            660             665             670

tgg ggt ggt aca gaa ata aaa gta tgg gtt gga cga gtc gaa gac ctg      2064
Trp Gly Gly Thr Glu Ile Lys Val Trp Val Gly Arg Val Glu Asp Leu
            675             680             685

acc gtt tac ttc ctg gaa cct caa aat ggg atg ttt ggc gtt gga tgt      2112
Thr Val Tyr Phe Leu Glu Pro Gln Asn Gly Met Phe Gly Val Gly Cys
            690             695             700

gta tat gga agg aat gat gac cgc aga ttt ggg ttc ttc tgt cat tct      2160
Val Tyr Gly Arg Asn Asp Asp Arg Arg Phe Gly Phe Phe Cys His Ser
705             710             715             720

gct cta gag ttt atc ctc cag aat gaa ttt tct cca cat ata ata cat      2208
Ala Leu Glu Phe Ile Leu Gln Asn Glu Phe Ser Pro His Ile Ile His
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tgc cat gat tgg tca agt gct ccg gtc gcc tgg cta tat aag gaa cac      2256
Cys His Asp Trp Ser Ser Ala Pro Val Ala Trp Leu Tyr Lys Glu His
            740                 745                 750

tat tcc caa tcc aga atg gca agc act cgg gtt gta ttt acc atc cac      2304
Tyr Ser Gln Ser Arg Met Ala Ser Thr Arg Val Val Phe Thr Ile His
        755                 760                 765

aat ctt gaa ttt gga gca cat tat att ggt aaa gca atg aca tac tgt      2352
Asn Leu Glu Phe Gly Ala His Tyr Ile Gly Lys Ala Met Thr Tyr Cys
        770                 775                 780

gat aaa gcc aca act gtt tct cct aca tat tca agg gac gtg gca ggc      2400
Asp Lys Ala Thr Thr Val Ser Pro Thr Tyr Ser Arg Asp Val Ala Gly
785                 790                 795                 800

cat ggc gcc att gct cct cat cgt gag aaa ttc tac ggc att ctc aat      2448
His Gly Ala Ile Ala Pro His Arg Glu Lys Phe Tyr Gly Ile Leu Asn
                805                 810                 815

gga att gat cca gat atc tgg gat ccg tac act gac aat ttt atc ccg      2496
Gly Ile Asp Pro Asp Ile Trp Asp Pro Tyr Thr Asp Asn Phe Ile Pro
            820                 825                 830

gtc cct tat act tgt gag aat gtt gtc gaa ggc aag agg gct gca aaa      2544
Val Pro Tyr Thr Cys Glu Asn Val Val Glu Gly Lys Arg Ala Ala Lys
        835                 840                 845

agg gcc ttg cag cag aag ttt gga tta cag caa act gat gtc cct att      2592
Arg Ala Leu Gln Gln Lys Phe Gly Leu Gln Gln Thr Asp Val Pro Ile
        850                 855                 860

gtc gga atc atc acc cgt ctg aca gca cag aag gga atc cac ctc atc      2640
Val Gly Ile Ile Thr Arg Leu Thr Ala Gln Lys Gly Ile His Leu Ile
865                 870                 875                 880

aag cac gca att cac cga acc ctc gag agc aat gga caa gtg gtt ttg      2688
Lys His Ala Ile His Arg Thr Leu Glu Ser Asn Gly Gln Val Val Leu
                885                 890                 895

ctt ggt tca gct cca gat cat cga ata caa ggc gat ttt tgc aga ttg      2736
Leu Gly Ser Ala Pro Asp His Arg Ile Gln Gly Asp Phe Cys Arg Leu
            900                 905                 910

gcc gat gct ctt cac ggt gtt tac cat ggt agg gtg aag ctt gtt cta      2784
Ala Asp Ala Leu His Gly Val Tyr His Gly Arg Val Lys Leu Val Leu
        915                 920                 925

acc tac gat gag cct ctt tct cac ctg ata tac gct ggc tcc gac ttc      2832
Thr Tyr Asp Glu Pro Leu Ser His Leu Ile Tyr Ala Gly Ser Asp Phe
        930                 935                 940

att att gtc cct tca atc ttt gaa ccc tgt ggc tta aca caa ctt gtt      2880
Ile Ile Val Pro Ser Ile Phe Glu Pro Cys Gly Leu Thr Gln Leu Val
945                 950                 955                 960

gcc atg cgt tat gga tcg atc cct ata gtt cgg aaa acc gga gga ctt      2928
Ala Met Arg Tyr Gly Ser Ile Pro Ile Val Arg Lys Thr Gly Gly Leu
                965                 970                 975

tac gac act gtc ttc gac gta gac aat gat aag gac cgg gct cgg tct      2976
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Tyr Asp Thr Val Phe Asp Val Asp Asn Asp Lys Asp Arg Ala Arg Ser
        980                 985             990

ctt ggt ctt gaa cca aat ggg ttc  agt ttc gac gga gcc  gac agc aat    3024
Leu Gly Leu Glu Pro Asn Gly Phe  Ser Phe Asp Gly Ala  Asp Ser Asn
        995             1000                1005

ggc gtg  gat tat gcc ctc aac  aga gca atc ggc gct  tgg ttc gat       3069
Gly Val  Asp Tyr Ala Leu Asn  Arg Ala Ile Gly Ala  Trp Phe Asp
        1010            1015           1020

gcc cgt  gat tgg ttc cac tcc  ctg tgt aag agg gtc  atg gag caa       3114
Ala Arg  Asp Trp Phe His Ser  Leu Cys Lys Arg Val  Met Glu Gln
        1025            1030           1035

gac tgg  tcg tgg aac cgg cct  gca ctg gac tac att  gaa ttg tac       3159
Asp Trp  Ser Trp Asn Arg Pro  Ala Leu Asp Tyr Ile  Glu Leu Tyr
        1040            1045           1050

cat gcc  gct cga aaa ttc tgacacccaa ctgaaccaat ggcaagaaca            3207
His Ala  Ala Arg Lys Phe
        1055

agcgcattgt gggatcgact acagtcatac agggctgtgc agatcgtctt gcttcagtta    3267

gtgccctctt cagttagttc caagcgcact acagtcgtac atagctgagg atcctcttgc    3327

ctcctccacc aggggaaaca aagcagaaat gcataagtgc attgggaaga cttttatgta    3387

tattgttaaa tttttccttt tcttttcctt ccctgcacct ggaaatggtt aagcgcatcg    3447

ccgagataag aaccacagta acattctgtg agtagctttg tatattctct catcttgtga    3507

aaactaatgt gcatgttagg ctctctgatc atgtggaagc tttgttatat gttacttatg    3567

gttatatggt atacatcaat gatatttaca tttgtggaaa aaaaaaaaaa aaaa          3621
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<211> 1059

<212> PRT

<213> Triticum aestivum

<220>

<221> misc_feature

<222> (507)..(507)

<223> The 'Xaa' at location 507 stands for Asp, Gly, Ala, or Val.

<220>

<221> misc_feature

<222> (1520)..(1520)

<223> n can be a or g or c or t, and the encoded amino acid cannot be a

ssigned with certainty.

<400> 10

Asp Ala Leu Tyr Val Asn Gly Leu Glu Ala Lys Glu Gly Asp His Thr
1   5   10   15

Ser Glu Lys Thr Asp Glu Asp Ala Leu His Val Lys Phe Asn Val Asp
            20   25   30

Asn Val Leu Arg Lys His Gln Ala Asp Arg Thr Gln Ala Val Glu Lys
        35   40   45

Lys Thr Trp Lys Lys Val Asp Glu Glu His Leu Tyr Met Thr Glu His
    50   55   60

Gln Lys Arg Ala Ala Glu Gly Gln Met Val Val Asn Glu Asp Glu Leu
65   70   75   80

Ser Ile Thr Glu Ile Gly Met Gly Arg Gly Asp Lys Ile Gln His Val
                85   90   95

Leu Ser Glu Glu Glu Leu Ser Trp Ser Glu Asp Glu Val Gln Leu Ile
        100   105   110

Glu Asp Asp Gly Gln Tyr Glu Val Asp Glu Thr Ser Val Ser Val Asn
        115   120   125

Val Glu Gln Asp Ile Gln Gly Ser Pro Gln Asp Val Val Asp Pro Gln
    130   135   140

Ala Leu Lys Val Met Leu Gln Glu Leu Ala Glu Lys Asn Tyr Ser Met
145   150   155   160

Arg Asn Lys Leu Phe Val Phe Pro Glu Val Val Lys Ala Asp Ser Val
                165   170   175

Ile Asp Leu Tyr Leu Asn Arg Asp Leu Thr Ala Leu Ala Asn Glu Pro
            180   185   190

Asp Val Val Ile Lys Gly Ala Phe Asn Gly Trp Lys Trp Arg Leu Phe
            195   200   205

Thr Glu Arg Leu His Lys Ser Asp Leu Gly Gly Val Trp Trp Ser Cys
    210   215   220

Lys Leu Tyr Ile Pro Lys Glu Ala Tyr Arg Leu Asp Phe Val Phe Phe
225   230   235   240

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Asn Gly Arg Thr Val Tyr Glu Asn Asn Gly Asn Asn Asp Phe Cys Ile
            245   250   255

Gly Ile Glu Gly Thr Met Asn Glu Asp Leu Phe Glu Asp Phe Leu Val
            260   265   270

Lys Glu Lys Gln Arg Glu Leu Glu Lys Leu Ala Met Glu Glu Ala Glu
        275   280   285

Arg Arg Thr Gln Thr Glu Glu Gln Arg Arg Arg Lys Glu Ala Arg Ala
    290   295   300

Ala Asp Glu Ala Val Arg Ala Gln Ala Lys Ala Glu Ile Glu Ile Lys
305   310   315   320

Lys Lys Lys Leu Gln Ser Met Leu Ser Leu Ala Arg Thr Cys Val Asp
            325   330   335

Asn Leu Trp Tyr Ile Glu Ala Ser Thr Asp Thr Arg Gly Asp Thr Ile
            340   345   350

Arg Leu Tyr Tyr Asn Arg Asn Ser Arg Pro Leu Ala His Ser Thr Glu
            355   360   365

Ile Trp Met His Gly Gly Tyr Asn Asn Trp Ser Asp Gly Leu Ser Ile
    370   375   380

Val Glu Ser Phe Val Lys Cys Asn Asp Lys Asp Gly Asp Trp Trp Tyr
385   390   395   400

Ala Asp Val Ile Pro Pro Glu Lys Ala Leu Val Leu Asp Trp Val Phe
            405   410   415

Ala Asp Gly Pro Ala Gly Asn Ala Arg Asn Tyr Asp Asn Asn Ala Arg
            420   425   430

Gln Asp Phe His Ala Ile Leu Pro Asn Asn Asn Val Thr Glu Glu Gly
        435   440   445

Phe Trp Ala Gln Glu Glu Gln Asn Ile Tyr Thr Arg Leu Leu Gln Glu
    450   455   460

Arg Arg Glu Lys Glu Glu Thr Met Lys Arg Lys Ala Glu Arg Ser Ala
465   470   475   480

Asn Ile Lys Ala Glu Met Lys Ala Lys Thr Met Arg Arg Phe Leu Leu
            485   490   495

Ser Gln Lys His Ile Val Tyr Thr Arg Thr Xaa Leu Lys Tyr Val Pro
            500   505   510

Gly Thr Thr Val Asp Val Leu Tyr Asn Pro Ser Asn Thr Val Leu Asn
            515   520   525

Gly Lys Ser Glu Gly Trp Phe Arg Cys Ser Phe Asn Leu Trp Met His
        530   535   540

Ser Ser Gly Ala Leu Pro Pro Gln Lys Met Val Lys Ser Gly Asp Gly
545   550   555   560

Pro Leu Leu Lys Ala Thr Val Asp Val Pro Pro Asp Ala Tyr Met Met
                565   570   575

Asp Phe Val Phe Ser Glu Trp Glu Glu Asp Gly Ile Tyr Asp Asn Arg
                580   585   590

Asn Gly Met Asp Tyr His Ile Pro Val Ser Asp Ser Ile Glu Thr Glu
            595   600   605

Asn Tyr Met Arg Ile Ile His Ile Ala Val Glu Met Ala Pro Val Ala
    610   615   620

Lys Val Gly Gly Leu Gly Asp Val Val Thr Ser Leu Ser Arg Ala Ile
625   630   635   640

Gln Asp Leu Gly His Thr Val Glu Val Ile Leu Pro Lys Tyr Asp Cys
                645   650   655

Leu Asn Gln Ser Ser Val Lys Asp Leu His Leu Tyr Gln Ser Phe Ser
            660   665   670

Trp Gly Gly Thr Glu Ile Lys Val Trp Val Gly Arg Val Glu Asp Leu
        675   680   685

Thr Val Tyr Phe Leu Glu Pro Gln Asn Gly Met Phe Gly Val Gly Cys
    690   695   700

Val Tyr Gly Arg Asn Asp Asp Arg Arg Phe Gly Phe Phe Cys His Ser
705   710   715   720

Ala Leu Glu Phe Ile Leu Gln Asn Glu Phe Ser Pro His Ile Ile His
                725   730   735

Cys His Asp Trp Ser Ser Ala Pro Val Ala Trp Leu Tyr Lys Glu His

Tyr Ser Gln Ser Arg Met Ala Ser Thr Arg Val Val Phe Thr Ile His
    755   760   765

Asn Leu Glu Phe Gly Ala His Tyr Ile Gly Lys Ala Met Thr Tyr Cys
    770   775   780

Asp Lys Ala Thr Thr Val Ser Pro Thr Tyr Ser Arg Asp Val Ala Gly
785   790   795   800

His Gly Ala Ile Ala Pro His Arg Glu Lys Phe Tyr Gly Ile Leu Asn
        805   810   815

Gly Ile Asp Pro Asp Ile Trp Asp Pro Tyr Thr Asp Asn Phe Ile Pro
        820   825   830

Val Pro Tyr Thr Cys Glu Asn Val Val Glu Gly Lys Arg Ala Ala Lys
    835   840   845

Arg Ala Leu Gln Gln Lys Phe Gly Leu Gln Gln Thr Asp Val Pro Ile
    850   855   860

Val Gly Ile Ile Thr Arg Leu Thr Ala Gln Lys Gly Ile His Leu Ile
865   870   875   880

Lys His Ala Ile His Arg Thr Leu Glu Ser Asn Gly Gln Val Val Leu
        885   890   895

Leu Gly Ser Ala Pro Asp His Arg Ile Gln Gly Asp Phe Cys Arg Leu
        900   905   910

Ala Asp Ala Leu His Gly Val Tyr His Gly Arg Val Lys Leu Val Leu
    915   920   925

Thr Tyr Asp Glu Pro Leu Ser His Leu Ile Tyr Ala Gly Ser Asp Phe
    930   935   940

Ile Ile Val Pro Ser Ile Phe Glu Pro Cys Gly Leu Thr Gln Leu Val
945   950   955   960

Ala Met Arg Tyr Gly Ser Ile Pro Ile Val Arg Lys Thr Gly Gly Leu
            965   970   975

Tyr Asp Thr Val Phe Asp Val Asp Asn Asp Lys Asp Arg Ala Arg Ser
        980   985   990

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Leu Gly Leu Glu Pro Asn Gly Phe Ser Phe Asp Gly Ala Asp Ser Asn
    995   1000   1005

Gly Val Asp Tyr Ala Leu Asn Arg Ala Ile Gly Ala Trp Phe Asp
  1010   1015   1020

Ala Arg Asp Trp Phe His Ser Leu Cys Lys Arg Val Met Glu Gln
  1025   1030   1035

Asp Trp Ser Trp Asn Arg Pro Ala Leu Asp Tyr Ile Glu Leu Tyr
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His Ala Ala Arg Lys Phe
  1055

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<211> 728

<212> DNA

<213> Triticum sp.

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gagatctcca cgccagagcg ttgtattcca attttagttc tttccccgtg aggaggggag   180
gctaggcggg cgaggcagag gggatagggc agtcgccgct gcgtggtgga ctgactggtg   240
tggtgggtgg tgggttttgc gggcggggtt tagtaggttc ccggaaatgg agatggctct   300
ccggccacgg agccctctgt gccctcggag cagtcagccg ctcgtcgtcg tccggccggc   360
cggccgcggc ggcggcctcg cgcaggtacg ggtgattatg gttcttgatt cggtcggttc   420
acggaatgtt gtttgatttg gttctgtccc gggtcaggtt catagtgatt ttattccgca   480
aaaaaaaaag gtttatagtg attttgattt ctttcatctc gggaacattt ttatatctgg   540
gagtcaaagg gcattggttt tgatttgcat gcggaacata ttggttattt attaatgtgg   600
tgagctggaa ttcatactgc ttaaaacgac gtgattttaa ttgctggaag aggtaaagaa   660
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atcatgga   728

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<211> 2446

<212> DNA

<213> Triticum sp.

<400> 12

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cgggaaatgc ttcaagctgc gcgacataca gagaagtgga tgatgtggtg gatgaaacta     180

gatcagaaga ggaaacattt gcgatggatt tgtttgcaag tgaatcaggc catgagaaac     240

atatggcagt ggatcatgtg ggtgaagcta ccgatgaaga agagacttac caacagcaat     300

atccagtacc gtcttcattc tctatgtggg acaaggctat tgctaaaaca ggtgtaagtt     360

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Gln Asp Leu Gly His Asn Val Glu Val
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Gln Asp Leu Gly His Thr Val Glu Val
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<212> PRT

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<223> Peptide

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Leu Thr Gln Leu Val Ala Met Arg Tyr Gly Ser
            20   25

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<211> 8

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1   5

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Lys Thr Gly Gly Leu Gly Asp Val Ala Gly Ala
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1   5   10

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1   5   10   15

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1   5   10   15

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Asp Val Gln Leu Val Met Leu Gly Thr Gly
1   5   10

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<222>   (13)..(13)

<223>   Xaa is an amino acid which is not specifically identified

<400>   53

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Leu Asn Gln Leu Tyr Ala Met Ala Tyr Gly Thr
            20   25

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1   5

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1   5   10   15

Pro Val Leu Ile Phe Arg Pro Thr Val Ala Gly Gly Gly Gly Gly Thr
            20   25   30

Gln Ser Leu Leu Arg Thr Thr Arg Phe Ala Arg Arg Arg Val Ile Arg
        35   40   45

Cys Val Val Ala Ser Pro Gly Cys Pro Asn Arg Lys Ser Arg Thr Ala
    50   55   60

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Ser Pro Asn Val Lys Val Ala Ala Tyr Ser Asn Tyr Ala Pro Arg Leu
65              70              75              80

Leu Val Glu Ser Ser Ser Lys Lys Ser Glu His His Asp Ser Ser Arg
            85              90              95

His Arg Glu Glu Thr Ile Asp Thr Tyr Asn Gly Leu Ser Gly Ser Asp
            100             105             110

Ala Ala Glu Leu Thr Ser Asn Arg Asp Val Glu Ile Glu Val Asp Leu
            115             120             125

Gln His Ile Ser Glu Glu Glu Leu Pro Gly Lys Val Ser Ile Asn Ala
    130             135             140

Ser Leu Gly Glu Met Glu Thr Val Asp Glu Ala Glu Val Glu Glu Asp
145             150             155             160

Lys Phe Glu Val Asp Thr Ser Gly Ile Val Leu Arg Asn Val Ala Val
            165             170             175

Arg Glu Val Asp Pro Lys Asp Glu His Asn Ala Lys Asp Val Phe Val
            180             185             190

Val Asp Ser Ser Gly Thr Ala Pro Asp Asn Ala Ala Val Glu Glu Val
    195             200             205

Val Asp Glu Ala Glu Val Glu Glu Asp Met Val Asp Val Asp Ile Leu
210             215             220

Gly Leu Asp Leu Asn Asn Ala Thr Ile Glu Glu Ile Asp Leu Met Glu
225             230             235             240

Glu Ala Leu Leu Glu Asn Phe Asp Val Asp Ser Pro Gly Asn Ala Ser
            245             250             255

Ser Gly Arg Thr Tyr Gly Gly Val Asp Glu Leu Gly Glu Leu Pro Ser
            260             265             270

Thr Ser Val Asp Cys Ile Ala Ile Asn Gly Lys Arg Arg Ser Leu Lys
            275             280             285

Pro Lys Pro Leu Pro Ile Val Arg Phe Gln Glu Gln Glu Gln Ile Val
    290             295             300

Leu Ser Ile Val Asp Glu Glu Gly Leu Ile Ala Ser Ser Cys Glu Glu
305             310             315             320
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Gly Gln Pro Val Val Asp Tyr Asp Lys Gln Glu Glu Asn Ser Thr Ala
                325   330   335

Phe Asp Glu Gln Lys Gln Leu Thr Asp Asp Phe Pro Glu Glu Gly Ile
            340   345   350

Ser Ile Val His Phe Pro Glu Pro Asn Asn Asp Ile Val Gly Ser Ser
        355   360   365

Lys Phe Leu Glu Gln Lys Gln Glu Leu Asp Gly Ser Tyr Lys Gln Asp
    370   375   380

Arg Ser Thr Thr Gly Leu His Glu Gln Asp Gln Ser Val Val Ser Ser
385   390   395   400

His Gly Gln Asp Lys Ser Ile Val Gly Val Pro Gln Gln Ile Gln Tyr
            405   410   415

Asn Asp Gln Ser Ile Ala Gly Ser His Arg Gln Asp Gln Ser Ile Ala
        420   425   430

Gly Ala Pro Glu Gln Ile Gln Ser Val Ala Gly Tyr Ile Lys Pro Asn
        435   440   445

Gln Ser Ile Val Gly Ser Cys Lys Gln His Glu Leu Ile Ile Pro Glu
    450   455   460

Pro Lys Lys Ile Glu Ser Ile Ile Ser Tyr Asn Glu Ile Asp Gln Ser
465   470   475   480

Ile Val Gly Ser His Lys Gln Asp Lys Ser Val Val Ser Val Pro Glu
            485   490   495

Gln Ile Gln Ser Ile Val Ser His Ser Lys Pro Asn Gln Ser Thr Val
            500   505   510

Asp Ser Tyr Arg Gln Ala Glu Ser Ile Ile Gly Val Pro Glu Lys Val
        515   520   525

Gln Ser Ile Thr Ser Tyr Asp Lys Leu Asp Gln Ser Ile Val Gly Ser
    530   535   540

Leu Lys Gln Asp Glu Pro Ile Ile Ser Val Pro Glu Lys Ile Gln Ser
545   550   555   560

Ile Val His Tyr Thr Lys Pro Asn Gln Ser Ile Val Gly Leu Pro Lys

                      565   570   575

Gln Gln Gln Ser Ile Val His Ile Val Glu Pro Lys Gln Ser Ile Asp
            580   585   590

Gly Phe Pro Lys Gln Asp Leu Ser Ile Val Gly Ile Ser Asn Glu Phe
        595   600   605

Gln Thr Lys Gln Leu Ala Thr Val Gly Thr His Asp Gly Leu Leu Met
    610   615   620

Lys Gly Val Glu Ala Lys Glu Thr Ser Gln Lys Thr Glu Gly Asp Thr
625   630   635   640

Leu Gln Ala Thr Phe Asn Val Asp Asn Leu Ser Gln Lys Gln Glu Gly
            645   650   655

Leu Thr Lys Glu Ala Asp Glu Ile Thr Ile Ile Glu Lys Ile Asn Asp
            660   665   670

Glu Asp Leu Val Met Ile Glu Glu Gln Lys Ser Ile Ala Met Asn Glu
        675   680   685

Glu Gln Thr Ile Val Thr Glu Glu Asp Ile Pro Met Ala Lys Val Glu
    690   695   700

Ile Gly Ile Asp Lys Ala Lys Phe Leu His Leu Leu Ser Glu Glu Glu
705   710   715   720

Ser Ser Trp Asp Glu Asn Glu Val Gly Ile Ile Glu Ala Asp Glu Gln
            725   730   735

Tyr Glu Val Asp Glu Thr Ser Met Ser Thr Glu Gln Asp Ile Gln Glu
            740   745   750

Ser Pro Asn Asp Asp Leu Asp Pro Gln Ala Leu Trp Ser Met Leu Gln
        755   760   765

Glu Leu Ala Glu Lys Asn Tyr Ser Leu Gly Asn Lys Leu Phe Thr Tyr
    770   775   780

Pro Asp Val Leu Lys Ala Asp Ser Thr Ile Asp Leu Tyr Phe Asn Arg
785   790   795   800

Asp Leu Ser Ala Val Ala Asn Glu Pro Asp Val Leu Ile Lys Gly Ala
            805   810   815

                              Page 76

Phe Asn Gly Trp Lys Trp Arg Phe Phe Thr Glu Lys Leu His Lys Ser
        820   825   830

Glu Leu Ala Gly Asp Trp Trp Cys Cys Lys Leu Tyr Ile Pro Lys Gln
        835   840   845

Ala Tyr Arg Met Asp Phe Val Phe Phe Asn Gly His Thr Val Tyr Glu
    850   855   860

Asn Asn Asn Asn Asn Asp Phe Val Ile Gln Ile Glu Ser Thr Met Asp
865   870   875   880

Glu Asn Leu Phe Glu Asp Phe Leu Ala Glu Glu Lys Gln Arg Glu Leu
            885   890   895

Glu Asn Leu Ala Asn Glu Glu Ala Glu Arg Arg Arg Gln Thr Asp Glu
        900   905   910

Gln Arg Arg Met Glu Glu Glu Arg Ala Ala Asp Lys Ala Asp Arg Val
        915   920   925

Gln Ala Lys Val Glu Val Glu Thr Lys Lys Asn Lys Leu Cys Asn Val
    930   935   940

Leu Gly Leu Ala Arg Ala Pro Val Asp Asn Leu Trp Tyr Ile Glu Pro
945   950   955   960

Ile Thr Thr Gly Gln Glu Ala Thr Val Arg Leu Tyr Tyr Asn Ile Asn
            965   970   975

Ser Arg Pro Leu Val His Ser Thr Glu Ile Trp Met His Gly Gly Tyr
        980   985   990

Asn Asn Trp Ile Asp Gly Leu Ser Phe Ala Glu Arg Leu Val His His
    995   1000   1005

His Asp Lys Asp Cys Asp Trp Trp Phe Ala Asp Val Val Val Pro
    1010   1015   1020

Glu Arg Thr Tyr Val Leu Asp Trp Val Phe Ala Asp Gly Pro Pro
    1025   1030   1035

Gly Ser Ala Arg Asn Tyr Asp Asn Asn Gly Gly His Asp Phe His
    1040   1045   1050

Ala Thr Leu Pro Asn Asn Met Thr Glu Glu Glu Tyr Trp Met Glu
    1055   1060   1065

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Glu Glu Gln Arg Ile Tyr Thr Arg Leu Gln Gln Glu Arg Arg Glu
1070   1075   1080

Arg Glu Glu Ala Ile Lys Arg Lys Ala Glu Arg Asn Ala Lys Met
1085   1090   1095

Lys Ala Glu Met Lys Glu Lys Thr Met Arg Met Phe Leu Val Ser
1100   1105   1110

Gln Lys His Ile Val Tyr Thr Glu Pro Leu Glu Ile His Ala Gly
1115   1120   1125

Thr Thr Ile Asp Val Leu Tyr Asn Pro Ser Asn Thr Val Leu Thr
1130   1135   1140

Gly Lys Pro Glu Val Trp Phe Arg Cys Ser Phe Asn Arg Trp Met
1145   1150   1155

Tyr Pro Gly Gly Val Leu Pro Pro Gln Lys Met Val Gln Ala Glu
1160   1165   1170

Asn Gly Ser His Leu Lys Ala Thr Val Tyr Val Pro Arg Asp Ala
1175   1180   1185

Tyr Met Met Asp Phe Val Phe Ser Glu Ser Glu Glu Gly Gly Ile
1190   1195   1200

Tyr Asp Asn Arg Asn Gly Leu Asp Tyr His Ile Pro Val Phe Gly
1205   1210   1215

Ser Ile Ala Lys Glu Pro Pro Met His Ile Val His Ile Ala Val
1220   1225   1230

Glu Met Ala Pro Ile Ala Lys Val Gly Gly Leu Gly Asp Val Val
1235   1240   1245

Thr Ser Leu Ser Arg Ala Val Gln Asp Leu Gly His Asn Val Glu
1250   1255   1260

Val Ile Leu Pro Lys Tyr Gly Cys Leu Asn Leu Ser Asn Val Lys
1265   1270   1275

Asn Leu Gln Ile His Gln Ser Phe Ser Trp Gly Gly Ser Glu Ile
1280   1285   1290

Asn Val Trp Arg Gly Leu Val Glu Gly Leu Cys Val Tyr Phe Leu
1295   1300   1305

Glu Pro Gln Asn Gly Met Phe Gly Val Gly Tyr Val Tyr Gly Arg
    1310   1315   1320

Asp Asp Asp Arg Arg Phe Gly Phe Phe Cys Arg Ser Ala Leu Glu
    1325   1330   1335

Phe Leu Leu Gln Ser Gly Ser Ser Pro Asn Ile Ile His Cys His
    1340   1345   1350

Asp Trp Ser Ser Ala Pro Val Ala Trp Leu His Lys Glu Asn Tyr
    1355   1360   1365

Ala Lys Ser Ser Leu Ala Asn Ala Arg Val Val Phe Thr Ile His
    1370   1375   1380

Asn Leu Glu Phe Gly Ala His His Ile Gly Lys Ala Met Arg Tyr
    1385   1390   1395

Cys Asp Lys Ala Thr Thr Val Ser Asn Thr Tyr Ser Lys Glu Val
    1400   1405   1410

Ser Gly His Gly Ala Ile Val Pro His Leu Gly Lys Phe Tyr Gly
    1415   1420   1425

Ile Leu Asn Gly Ile Asp Pro Asp Ile Trp Asp Pro Tyr Asn Asp
    1430   1435   1440

Asn Phe Ile Pro Val His Tyr Thr Cys Glu Asn Val Val Glu Gly
    1445   1450   1455

Lys Arg Ala Ala Lys Arg Ala Leu Gln Gln Lys Phe Gly Leu Gln
    1460   1465   1470

Gln Ile Asp Val Pro Val Val Gly Ile Val Thr Arg Leu Thr Ala
    1475   1480   1485

Gln Lys Gly Ile His Leu Ile Lys His Ala Ile His Arg Thr Leu
    1490   1495   1500

Glu Arg Asn Gly Gln Val Val Leu Leu Gly Ser Ala Pro Asp Ser
    1505   1510   1515

Arg Ile Gln Ala Asp Phe Val Asn Leu Ala Asn Thr Leu His Gly
    1520   1525   1530

Val Asn His Gly Gln Val Arg Leu Ser Leu Thr Tyr Asp Glu Pro
                              Page 79

1535   1540   1545

Leu Ser His Leu Ile Tyr Ala Gly Ser Asp Phe Ile Leu Val Pro
    1550   1555   1560

Ser Ile Phe Glu Pro Cys Gly Leu Thr Gln Leu Val Ala Met Arg
    1565   1570   1575

Tyr Gly Thr Ile Pro Ile Val Arg Lys Thr Gly Gly Leu Phe Asp
    1580   1585   1590

Thr Val Phe Asp Val Asp Asn Asp Lys Glu Arg Ala Arg Asp Arg
    1595   1600   1605

Gly Leu Glu Pro Asn Gly Phe Ser Phe Asp Gly Ala Asp Ser Asn
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Gly Val Asp Tyr Ala Leu Asn Arg Ala Ile Ser Ala Trp Phe Asp
    1625   1630   1635

Ala Arg Ser Trp Phe His Ser Leu Cys Lys Arg Val Met Glu Gln
    1640   1645   1650

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            20   25   30

Ser His Gly Thr Thr Ser Leu Ser Val Gln Ser Ser Ser Trp Arg Lys
        35   40   45

Asp Gly Met Val Thr Gly Val Ser Phe Ser Ile Cys Ala Asn Phe Ser
    50   55   60

Gly Arg Arg Arg Arg Lys Val Ser Thr Pro Arg Ser Gln Gly Ser Ser
65   70   75   80

Pro Lys Gly Phe Val Pro Arg Lys Pro Ser Gly Met Ser Thr Gln Arg
            85   90   95

Lys Val Gln Lys Ser Asn Gly Asp Lys Glu Ser Lys Ser Thr Ser Thr
            100   105   110

Ser Lys Glu Ser Glu Ile Ser Asn Gln Lys Thr Val Glu Ala Arg Val
    115   120   125

Glu Thr Ser Asp Asp Asp Thr Lys Gly Val Val Arg Asp His Lys Phe
    130   135   140

Leu Glu Asp Glu Asp Glu Ile Asn Gly Ser Thr Lys Ser Ile Ser Met
145   150   155   160

Ser Pro Val Arg Val Ser Ser Gln Phe Val Glu Ser Glu Glu Thr Gly
            165   170   175

Gly Asp Asp Lys Asp Ala Val Lys Leu Asn Lys Ser Lys Arg Ser Glu
            180   185   190

Glu Ser Gly Phe Ile Ile Asp Ser Val Ile Arg Glu Gln Ser Gly Ser
    195   200   205

Gln Gly Glu Thr Asn Ala Ser Ser Lys Gly Ser His Ala Val Gly Thr
    210   215   220

Lys Leu Tyr Glu Ile Leu Gln Val Asp Val Glu Pro Gln Gln Leu Lys
225   230   235   240

Glu Asn Asn Ala Gly Asn Val Glu Tyr Lys Gly Pro Val Ala Ser Lys
            245   250   255

Leu Leu Glu Ile Thr Lys Ala Ser Asp Val Glu His Thr Glu Ser Asn
            260   265   270

Glu Ile Asp Asp Leu Asp Thr Asn Ser Phe Phe Lys Ser Asp Leu Ile
    275   280   285

Glu Glu Asp Glu Pro Leu Ala Ala Gly Thr Val Glu Thr Gly Asp Ser
    290   295   300

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Ser Leu Asn Leu Arg Leu Glu Met Glu Ala Asn Leu Arg Arg Gln Ala
305   310   315   320

Ile Glu Arg Leu Ala Glu Glu Asn Leu Leu Gln Gly Ile Arg Leu Phe
            325   330   335

Cys Phe Pro Glu Val Val Lys Pro Asp Glu Asp Val Glu Ile Phe Leu
            340   345   350

Asn Arg Gly Leu Ser Thr Leu Lys Asn Glu Ser Asp Val Leu Ile Met
            355   360   365

Gly Ala Phe Asn Glu Trp Arg Tyr Arg Ser Phe Thr Thr Arg Leu Thr
370   375   380

Glu Thr His Leu Asn Gly Asp Trp Trp Ser Cys Lys Ile His Val Pro
385   390   395   400

Lys Glu Ala Tyr Arg Ala Asp Phe Val Phe Phe Asn Gly Gln Asp Val
            405   410   415

Tyr Asp Asn Asn Asp Gly Asn Asp Phe Ser Ile Thr Val Lys Gly Gly
            420   425   430

Met Gln Ile Ile Asp Phe Glu Asn Phe Leu Leu Glu Glu Lys Trp Arg
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Glu Gln Glu Lys Leu Ala Lys Glu Gln Ala Glu Arg Glu Arg Leu Ala
450   455   460

Glu Glu Gln Arg Arg Ile Glu Ala Glu Lys Ala Glu Ile Glu Ala Asp
465   470   475   480

Arg Ala Gln Ala Lys Glu Glu Ala Ala Lys Lys Lys Val Leu Arg
            485   490   495

Glu Leu Met Val Lys Ala Thr Lys Thr Arg Asp Ile Thr Trp Tyr Ile
            500   505   510

Glu Pro Ser Glu Phe Lys Cys Glu Asp Lys Val Arg Leu Tyr Tyr Asn
            515   520   525

Lys Ser Ser Gly Pro Leu Ser His Ala Lys Asp Leu Trp Ile His Gly
            530   535   540

Gly Tyr Asn Asn Trp Lys Asp Gly Leu Ser Ile Val Lys Lys Leu Val
545   550   555   560
Page 82

Lys Ser Glu Arg Ile Asp Gly Asp Trp Trp Tyr Thr Glu Val Val Ile
            565   570   575

Pro Asp Gln Ala Leu Phe Leu Asp Trp Val Phe Ala Asp Gly Pro Pro
            580   585   590

Lys His Ala Ile Ala Tyr Asp Asn Asn His Arg Gln Asp Phe His Ala
            595   600   605

Ile Val Pro Asn His Ile Pro Glu Glu Leu Tyr Trp Val Glu Glu Glu
    610   615   620

His Gln Ile Phe Lys Thr Leu Gln Glu Glu Arg Arg Leu Arg Glu Ala
625   630   635   640

Ala Met Arg Ala Lys Val Glu Lys Thr Ala Leu Leu Lys Thr Glu Thr
            645   650   655

Lys Glu Arg Thr Met Lys Ser Phe Leu Leu Ser Gln Lys His Val Val
            660   665   670

Tyr Thr Glu Pro Leu Asp Ile Gln Ala Gly Ser Ser Val Thr Val Tyr
            675   680   685

Tyr Asn Pro Ala Asn Thr Val Leu Asn Gly Lys Pro Glu Ile Trp Phe
    690   695   700

Arg Cys Ser Phe Asn Arg Trp Thr His Arg Leu Gly Pro Leu Pro Pro
705   710   715   720

Gln Lys Met Ser Pro Ala Glu Asn Gly Thr His Val Arg Ala Thr Val
            725   730   735

Lys Val Pro Leu Asp Ala Tyr Met Met Asp Phe Val Phe Ser Glu Arg
            740   745   750

Glu Asp Gly Gly Ile Phe Asp Asn Lys Ser Gly Met Asp Tyr His Ile
            755   760   765

Pro Val Phe Gly Gly Val Ala Lys Glu Pro Pro Met His Ile Val His
    770   775   780

Ile Ala Val Glu Met Ala Pro Ile Ala Lys Val Gly Gly Leu Gly Asp
785   790   795   800

Val Val Thr Ser Leu Ser Arg Ala Val Gln Asp Leu Asn His Asn Val
                            Page 83

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                805                    810                    815

Asp Ile Ile Leu Pro Lys Tyr Asp Cys Leu Lys Met Asn Asn Val Lys
            820             825             830

Asp Phe Arg Phe His Lys Asn Tyr Phe Trp Gly Gly Thr Glu Ile Lys
        835             840             845

Val Trp Phe Gly Lys Val Glu Gly Leu Ser Val Tyr Phe Leu Glu Pro
    850             855             860

Gln Asn Gly Leu Phe Ser Lys Gly Cys Val Tyr Gly Cys Ser Asn Asp
865             870             875             880

Gly Glu Arg Phe Gly Phe Phe Cys His Ala Ala Leu Glu Phe Leu Leu
            885             890             895

Gln Gly Gly Phe Ser Pro Asp Ile Ile His Cys His Asp Trp Ser Ser
            900             905             910

Ala Pro Val Ala Trp Leu Phe Lys Glu Gln Tyr Thr His Tyr Gly Leu
    915             920             925

Ser Lys Ser Arg Ile Val Phe Thr Ile His Asn Leu Glu Phe Gly Ala
    930             935             940

Asp Leu Ile Gly Arg Ala Met Thr Asn Ala Asp Lys Ala Thr Thr Val
945             950             955             960

Ser Pro Thr Tyr Ser Gln Glu Val Ser Gly Asn Pro Val Ile Ala Pro
            965             970             975

His Leu His Lys Phe His Gly Ile Val Asn Gly Ile Asp Pro Asp Ile
            980             985             990

Trp Asp Pro Leu Asn Asp Lys Phe Ile Pro Ile Pro Tyr Thr Ser Glu
        995             1000            1005

Asn Val Val Glu Gly Lys Thr Ala Ala Lys Glu Ala Leu Gln Arg
    1010            1015            1020

Lys Leu Gly Leu Lys Gln Ala Asp Leu Pro Leu Val Gly Ile Ile
    1025            1030            1035

Thr Arg Leu Thr His Gln Lys Gly Ile His Leu Ile Lys His Ala
    1040            1045            1050
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Ile Trp  Arg Thr Leu Glu Arg  Asn Gly Gln Val Val  Leu Leu Gly
    1055              1060              1065


Ser Ala  Pro Asp Pro Arg Val  Gln Asn Asn Phe Val  Asn Leu Ala
    1070              1075              1080


Asn Gln  Leu His Ser Lys Tyr  Asn Asp Arg Ala Arg  Leu Cys Leu
    1085              1090              1095


Thr Tyr  Asp Glu Pro Leu Ser  His Leu Ile Tyr Ala  Gly Ala Asp
    1100              1105              1110


Phe Ile  Leu Val Pro Ser Ile  Phe Glu Pro Cys Gly  Leu Thr Gln
    1115              1120              1125


Leu Thr  Ala Met Arg Tyr Gly  Ser Ile Pro Val Val  Arg Lys Thr
    1130              1135              1140


Gly Gly  Leu Tyr Asp Thr Val  Phe Asp Val Asp His  Asp Lys Glu
    1145              1150              1155


Arg Ala  Gln Gln Cys Gly Leu  Glu Pro Asn Gly Phe  Ser Phe Asp
    1160              1165              1170


Gly Ala  Asp Ala Gly Gly Val  Asp Tyr Ala Leu Asn  Arg Ala Leu
    1175              1180              1185


Ser Ala  Trp Tyr Asp Gly Arg  Asp Trp Phe Asn Ser  Leu Cys Lys
    1190              1195              1200


Gln Val  Met Glu Gln Asp Trp  Ser Trp Asn Arg Pro  Ala Leu Asp
    1205              1210              1215


Tyr Leu  Glu Leu Tyr His Ala  Ala Arg Lys Leu Glu
    1220              1225              1230
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Met Ala Ala Leu Val Thr Ser Gln Leu Ala Thr Ser Gly Thr Val Leu
1               5               10              15
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Ser Val Thr Asp Arg Phe Arg Arg Pro Gly Phe Gln Gly Leu Arg Pro
           20   25   30

Arg Asn Pro Ala Asp Ala Ala Leu Gly Met Arg Thr Val Gly Ala Ser
           35   40   45

Ala Ala Pro Lys Gln Ser Arg Lys Pro His Arg Phe Asp Arg Arg Cys
    50   55   60

Leu Ser Met Val Val Arg Ala Thr Gly Ser Gly Gly Met Asn Leu Val
65   70   75   80

Phe Val Gly Ala Glu Met Ala Pro Trp Ser Lys Thr Gly Gly Leu Gly
              85   90   95

Asp Val Leu Gly Gly Leu Pro Ala Ala Met Ala Ala Asn Gly His Arg
           100   105   110

Val Met Val Ile Ser Pro Arg Tyr Asp Gln Tyr Lys Asp Ala Trp Asp
        115   120   125

Thr Ser Val Ile Ser Glu Ile Lys Val Val Asp Arg Tyr Glu Arg Val
    130   135   140

Arg Tyr Phe His Cys Tyr Lys Arg Gly Val Asp Arg Val Phe Val Asp
145   150   155   160

His Pro Cys Phe Leu Glu Lys Val Arg Gly Lys Thr Lys Glu Lys Ile
              165   170   175

Tyr Gly Pro Asp Ala Gly Thr Asp Tyr Glu Asp Asn Gln Gln Arg Phe
           180   185   190

Ser Leu Leu Cys Gln Ala Ala Leu Glu Val Pro Arg Ile Leu Asp Leu
    195   200   205

Asn Asn Asn Pro His Phe Ser Gly Pro Tyr Ala Met Leu Cys Arg Ala
    210   215   220

Val Pro Arg Arg Ala Gly Glu Asp Val Val Phe Val Cys Asn Asp Trp
225   230   235   240

His Thr Gly Leu Leu Ala Cys Tyr Leu Lys Ser Asn Tyr Gln Ser Asn
              245   250   255

Gly Ile Tyr Arg Thr Ala Lys Val Ala Phe Cys Ile His Asn Ile Ser
           260   265   270

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Tyr Gln Gly Arg Phe Ser Phe Asp Asp Phe Ala Gln Leu Asn Leu Pro
        275   280   285

Asp Arg Phe Lys Ser Ser Phe Asp Phe Ile Asp Gly Tyr Asp Lys Pro
    290   295   300

Val Glu Gly Arg Lys Ile Asn Trp Met Lys Ala Gly Ile Leu Gln Ala
305   310   315   320

Asp Lys Val Leu Thr Val Ser Pro Tyr Tyr Ala Glu Glu Leu Ile Ser
                325   330   335

Gly Glu Ala Arg Gly Cys Glu Leu Asp Asn Ile Met Arg Leu Thr Gly
            340   345   350

Ile Thr Gly Ile Val Asn Gly Met Asp Val Ser Glu Trp Asp Pro Ile
        355   360   365

Lys Asp Lys Phe Leu Thr Val Asn Tyr Asp Val Thr Thr Ala Leu Glu
    370   375   380

Gly Lys Ala Leu Asn Lys Glu Ala Leu Gln Ala Glu Val Gly Leu Pro
385   390   395   400

Val Asp Arg Lys Val Pro Leu Val Ala Phe Ile Gly Arg Leu Glu Glu
                405   410   415

Gln Lys Gly Pro Asp Val Met Ile Ala Ala Ile Pro Glu Ile Val Lys
            420   425   430

Glu Glu Asp Val Gln Ile Val Leu Leu Gly Thr Gly Lys Lys Lys Phe
            435   440   445

Glu Arg Leu Leu Lys Ser Val Glu Glu Lys Phe Pro Thr Lys Val Arg
    450   455   460

Ala Val Val Arg Phe Asn Ala Pro Leu Ala His Gln Met Met Ala Gly
465   470   475   480

Ala Asp Val Leu Ala Val Thr Ser Arg Phe Glu Pro Cys Gly Leu Ile
                485   490   495

Gln Leu Gln Gly Met Arg Tyr Gly Thr Pro Cys Ala Cys Ala Ser Thr
            500   505   510

Gly Gly Leu Val Asp Thr Ile Val Glu Gly Lys Thr Gly Phe His Met

Gly Arg Leu Ser Val Asp Cys Asn Val Val Glu Pro Ala Asp Val Lys
    530   535   540

Lys Val Val Thr Thr Leu Lys Arg Ala Val Lys Val Val Gly Thr Pro
545   550   555   560

Ala Tyr His Glu Met Val Lys Asn Cys Met Ile Gln Asp Leu Ser Trp
           565   570   575

Lys Gly Pro Ala Lys Asn Trp Glu Asp Val Leu Leu Glu Leu Gly Val
          580   585   590

Glu Gly Ser Glu Pro Gly Ile Val Gly Glu Glu Ile Ala Pro Leu Ala
         595   600   605

Leu Glu Asn Val Ala Ala Pro
    610   615

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Met Ala Ala Thr Gly Val Gly Ala Gly Cys Leu Ala Pro Ser Val Arg
1   5   10   15

Leu Arg Ala Asp Pro Ala Thr Ala Ala Arg Ala Ser Ala Cys Val Val
         20   25   30

Arg Ala Arg Leu Arg Arg Leu Ala Arg Gly Arg Tyr Val Ala Glu Leu
         35   40   45

Ser Arg Glu Gly Pro Ala Ala Arg Pro Ala Gln Gln Gln Gln Leu Ala
         50   55   60

Pro Pro Leu Val Pro Gly Phe Leu Ala Pro Pro Pro Pro Ala Pro Ala
65   70   75   80

Gln Ser Pro Ala Pro Thr Gln Pro Pro Leu Pro Asp Ala Gly Val Gly
          85   90   95

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Glu Leu Ala Pro Asp Leu Leu Leu Glu Gly Ile Ala Glu Asp Ser Ile
            100               105             110

Asp Ser Ile Ile Val Ala Ala Ser Glu Gln Asp Ser Glu Ile Met Asp
            115             120             125

Ala Asn Glu Gln Pro Gln Ala Lys Val Thr Arg Ser Ile Val Phe Val
    130             135             140

Thr Gly Glu Ala Ala Pro Tyr Ala Lys Ser Gly Gly Leu Gly Asp Val
145             150             155             160

Cys Gly Ser Leu Pro Ile Ala Leu Ala Ala Arg Gly His Arg Val Met
            165             170             175

Val Val Met Pro Arg Tyr Leu Asn Gly Ser Ser Asp Lys Asn Tyr Ala
            180             185             190

Lys Ala Leu Tyr Thr Gly Lys His Ile Lys Ile Pro Cys Phe Gly Gly
            195             200             205

Ser His Glu Val Thr Phe Phe His Glu Tyr Arg Asp Asn Val Asp Trp
    210             215             220

Val Phe Val Asp His Pro Ser Tyr His Arg Pro Gly Ser Leu Tyr Gly
225             230             235             240

Asp Asn Phe Gly Ala Phe Gly Asp Asn Gln Phe Arg Tyr Thr Leu Leu
            245             250             255

Cys Tyr Ala Ala Cys Glu Ala Pro Leu Ile Leu Glu Leu Gly Gly Tyr
            260             265             270

Ile Tyr Gly Gln Asn Cys Met Phe Val Val Asn Asp Trp His Ala Ser
            275             280             285

Leu Val Pro Val Leu Leu Ala Ala Lys Tyr Arg Pro Tyr Gly Val Tyr
    290             295             300

Arg Asp Ser Arg Ser Thr Leu Val Ile His Asn Leu Ala His Gln Gly
305             310             315             320

Leu Glu Pro Ala Ser Thr Tyr Pro Asp Leu Gly Leu Pro Pro Glu Trp
            325             330             335

Tyr Gly Ala Leu Glu Trp Val Phe Pro Glu Trp Ala Arg Arg His Ala
            340             345             350
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Leu Asp Lys Gly Glu Ala Val Asn Phe Leu Lys Gly Ala Val Val Thr
    355   360   365

Ala Asp Arg Ile Val Thr Val Ser Gln Gly Tyr Ser Trp Glu Val Thr
    370   375   380

Thr Ala Glu Gly Gly Gln Gly Leu Asn Glu Leu Leu Ser Ser Arg Lys
385   390   395   400

Ser Val Leu Asn Gly Ile Val Asn Gly Ile Asp Ile Asn Asp Trp Asn
         405   410   415

Pro Thr Thr Asp Lys Cys Leu Pro His His Tyr Ser Val Asp Asp Leu
        420   425   430

Ser Gly Lys Ala Lys Cys Lys Ala Glu Leu Gln Lys Glu Leu Gly Leu
      435   440   445

Pro Val Arg Glu Asp Val Pro Leu Ile Gly Phe Ile Gly Arg Leu Asp
    450   455   460

Tyr Gln Lys Gly Ile Asp Leu Ile Lys Met Ala Ile Pro Glu Leu Met
465   470   475   480

Arg Glu Asp Val Gln Phe Val Met Leu Gly Ser Gly Asp Pro Ile Phe
        485   490   495

Glu Gly Trp Met Arg Ser Thr Glu Ser Ser Tyr Lys Asp Lys Phe Arg
        500   505   510

Gly Trp Val Gly Phe Ser Val Pro Val Ser His Arg Ile Thr Ala Gly
      515   520   525

Cys Asp Ile Leu Leu Met Pro Ser Arg Phe Glu Pro Cys Gly Leu Asn
    530   535   540

Gln Leu Tyr Ala Met Gln Tyr Gly Thr Val Pro Val Val His Gly Thr
545   550   555   560

Gly Gly Leu Arg Asp Thr Val Glu Thr Phe Asn Pro Phe Gly Ala Lys
        565   570   575

Gly Glu Glu Gly Thr Gly Trp Ala Phe Ser Pro Leu Thr Val Asp Lys
      580   585   590

Met Leu Trp Ala Leu Arg Thr Ala Met Ser Thr Phe Arg Glu His Lys
      595   600   605

Pro Ser Trp Glu Gly Leu Met Lys Arg Gly Met Thr Lys Asp His Thr
    610   615   620

Trp Asp His Ala Ala Glu Gln Tyr Glu Gln Ile Phe Glu Trp Ala Phe
625   630   635   640

Val Asp Gln Pro Tyr Val Met
                645

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Pro Val Asn Gly Glu Asn Lys
1   5